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Small Cupolas.

BY THOS. D. WEST.

Now that trade is, to say the least, not brisk, a few words about small cupolas may be appropriate. When trade is brisk, nearly all machinery shops cast every day; when dull, many are more likely to cast once a week. Whether trade is dull or brisk, castings are wanted in a hurry; often the duller the trade, the greater the hurry. Some want them even before they are ordered. They think a casting should be had the same as a piece of forging or carpenter work.

Waiting for a small casting in dull times is often caused through waiting for a decreased force to get up enough work to pay for running off a heat. The expense of running off light heats in some shops is very heavy, the cost being regulated by the size of cupola—the smaller the cupola, the less the expense.

Small cupolas are not only good for running light heats, but are valuable for testing modern novel brands of pig iron. Pig iron is something of a mystery, and to find its qualities it must be worked. To test a sample of pig iron in a large cupola is not always practicable, from the fact that castings are made of mixtures; and even would circumstances allow the first charge to be all of one brand of pig, there is little assurance of its being entirely free of upper mixtures. With a small cupola, and 30 to 50 cents' worth of fuel, three or four hundred-weight of pig can be melted, with an assurance of the casting being all the product of that special pig.

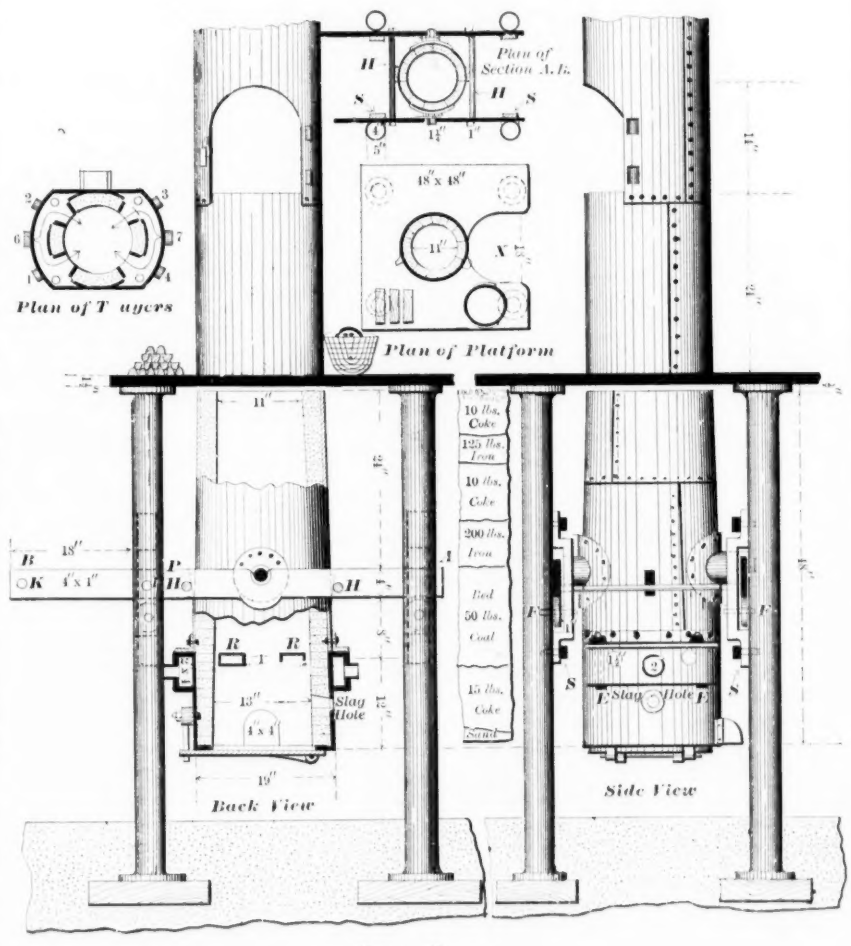
Small cupolas are often as useful in large shops as in small ones. In the whole country there might be found a dozen large shops having small cupolas, and out of the dozen there might be four that have been used over a dozen times. It is very easy to build small cupolas, but something of a job to successfully run them. Notwithstanding this, the principle of melting is the same in a small cupola as in a large one.

For manipulation in handling, there is not the room in small cupolas that there is in large ones, and on this account the small cupola is not popular.

There are two styles of small cupolas in use. The first is upon the same plan as the common round, straight cupola, and the second is made so as to be turned upside down, for convenience in cleaning and dumping. Knowing the disadvantages attending the successful running of small cupolas, ranging from 12″ to 18″, I have designed, as shown, a plan that I think will fully meet the requirements. If there are any upon the same plan, I would be pleased to learn of them.

The cupola here shown will occupy a space about four feet square. The working portion is hung by two cast iron trunnions, having a wrought iron 1¼″ pin cast in each. The trunnions work in a sliding rest, of one of which a face view is seen at *B*, *A*, in back view of cupola.

An end view of the slides is shown in the side view. The plan of the slides is seen in small cut at the top. Shown in back and side views, under the sliding rests, are friction wheels. These slides are held in place by the standards, *S S*, shown bolted to the columns. By a slight push the working portion of cupola can be brought out from below the upper portion and stack. A pin inserted through *P* to *K*, prevents any further sliding of the rests. After this the steadying bars, *H H*, shown in the plan as well as in back view, are removed. The cupola can now be turned to a horizontal position. As this portion of the cupola is only four feet long, by the means of the drop bottom a man can reach and see all parts of the inside, thereby giving him a good opportunity to thoroughly pick out and clearly daub it up. This is almost an impossibility in the instance of many small cupolas. With this part of the work rightly and handily performed, lies the main secret of successful melting in small cupolas.



SMALL CUPOLA.

In picking out and daubing up small cupolas care and cleanliness must be exercised. The lining should be kept as smooth and even as possible; any roughness has a tendency to make the charges hang up. It is an easy matter for iron to become wedged in such small cupolas. The daubing would better stand a long heat if it were dried, all cracks filled, and then given a coat of good blacking, thereby making it as smooth and clean as the linings of ladles.

Not only is it essential that the cupola should be clean, but the iron and fuel should be clean as well. Dirt creates slag, and slag could soon bung up any cupola. The slag hole, if properly managed, greatly mitigates the disastrous effect of slag. Dirt in any form is detrimental to successful melting. With large cupolas one may be somewhat careless and unclean, but with small ones attention to these points must be given.

The thickness of lining for small cupola can range from 1″ up to 4½″. The 1″ lining is obtained by daubing the shell with ¾ of good fire clay mixed with ¼ of sharp sand. To mix them well they should be boiled together in a kettle. Common clay could be used, but in the end the fire clay would be cheapest. A 2½″ or 4½″ lining is made with fire brick. For small cupolas, intended for frequent use, the 2½″ thickness of lining is about as thin as should be put in. For daily use the 4½″ lining would be preferable, as this thickness would last longer than a thinner one. To use the 4½″ lining the shell of cupola would, of course, require to be larger than shown.

The working portion of cupola shown has, in the length of four feet, a taper of 2″. This is a point I am aware is not much practiced, which is another reason for ill workings. Small cupolas are better for having a taper, as it assists in preventing the stock from becoming wedged or hung up.

In constructing the shell for small cupolas, there are several ways in which it may be done. One is to make it out of all boiler iron, and another by placing cast-iron rings on top of each other. A third plan is to bind vertically placed cast-iron slabs or staves with wrought iron rings, and a fourth to make a square shell by bolting together cast-iron plates. The fifth, a crank's plan, is to line up a flour barrel.

In the cupola shown the bottom is made of cast-iron ⅝″ thick. From the tuyeres up boiler iron is used. The slides, *A B*, are of wrought iron, and the platform plate of cast iron. The plan of tuyeres shown is one that will evenly distribute the blast. At 1, 2, 3 and 4 are peep-holes, which may be plugged, as shown, with wooden stoppers, or they can be closed with swinging slides. Numbers 6 and 7 are nozzles to attach leather, rubber or sheet-iron blast pipe to. The pipes must be made adjustable, so as to allow the cupola to be removed. The tuyere boxes, seen at *R R* in back view of cupola, are independent of the outer shell, and are set in when lining up.

The construction of the tuyeres, as shown, is, of course, more expensive than were nothing but two round tuyeres used. Some small cupolas have the blast thus directly admitted. It is a cheap and ready plan, but I think the plan given is the best, as for small cupola there is not the pressure required to get air to the center as there is for large ones. Admitting the air, as shown, breaks its direct force, and admits it in a much more even and in a milder manner, so that it does not have such a chilling effect upon the fuel as it does when passing directly from the blast pipe into the cupola. The blast pressure for cupolas, ranging from 12″ up to 18″, using all coke for fuel, should be from three up to five ounces; with coal and coke, four to six ounces. Using all coal, it should be from seven to ten ounces.

The stacks for small cupolas need not be continuous, as for large ones. After a foot or two above the top of charging door, they may be led into the stack of a larger cupola, or into a chimney.

Between the cupola cuts is shown the manner of charging. In charging the working portion of the cupola, it would be better to have it slide out to come in under the platform hole, *X*. This would give a good chance to properly and conveniently charge. After charging it can be pushed back, locked and the portion of cupola above platform charged. The half-inch of space between the platform and underneath portion of cupola could, to prevent the blaze from coming out, be stopped up with clay.

The bed's weight of fuel, given in cut, is intended to place the bed about 13″ above the top of tuyere. With trials made of coal and coke in the shop, the given weights would bring it about as shown. As but few cupolas are exactly alike in measurement, or fuels of the same specific gravity, instead of giving the bed weight, it would be more reliable to state the height which the top of bed should be above the tuyere. For a heat of nine hundred pounds, having no coke in bed, it should be 12″ above tuyere. Above nine hundred, add from 1″ to 3″ to height of bed. If all coke is used, have bed 18″ above tuyeres; and for a heat of ten hundred or over, add from 2″ to 6″ to height. Using all coke between charges, continue as shown. Should all coal be used, double the weight of fuel and iron in charging, which would be 20 pounds of fuel instead of 10, and 250 pounds instead of 125 of iron. The fuel should be of egg size, and the pigs broken into four or five pieces, and scrap in like proportion.

The charges for a 15″ cupola could be made as follows: On a coal bed charge 350 pounds of iron, after which, with coke for fuel, have charges, 17 pounds of coke and 200 pounds of iron. With all coal, double the charges.

The charges for 18″ cupola, on coal bed: 500 pounds of iron; coke between charges of 300 pounds of iron, 25 pounds. For coal charges, double those above. If, in any of

the three sizes, coke is used in place of coal for the bed, then make the first charge of iron no heavier than those given for the upper charges. Should the iron come too dull for very light castings, add to height of bed from 2″ to 6″, and between charges 2, 4 to 6 pounds of fuel. By using coal for the bed, the cupola will melt more iron than if coke is used, as the coal will stand the chilling effect of the blast better than coke. By slagging the cupola, it can be made to melt as much again iron as where no attention is paid to slagging out. The capacity of a 12″ cupola, when slagged out, is about 1,500 pounds; that of a 15″ cupola, 2,500, and an 18″ cupola, 3,500 pounds. With excellent management the above figures might be exceeded. I would here state that, although I have shown the cut of a 12″ cupola, for daily practical working I would not recommend the use of one less than 15″.

The reason for placing the few pounds of coke below the coal shown in the bed is more for the purpose of assisting in kindling the coal, than for saving expense. Coal is harder to kindle than coke, and in small cupolas the difficulty is greater than in larger ones.

The construction shown is applicable for any of the three sizes mentioned. The tuyeres could be 4″ lower were all coal used, but for coke the height given is required. A cheaper cupola could be constructed, but for cheapness in the end I think the one here represented would be satisfactory.

While upon this subject, it might be well to suggest an idea with reference to running large cupolas for constant light heats. In many cases, were the cupola lined up so as to make it smaller, much expense in fuel would be saved, For example: a 48″ cupola could, at a small outlay, be lined up to 30″; then, when business warranted it, the false lining could be taken out, and most of the fire-brick saved for periodical American business depressions.

Railroad Snow Plowing.

BY ANGUS SINCLAIR.

TROUBLE AND EXPENSE CAUSED TO RAILROADS BY SNOW.

At this season of the year many of the Northern and Western railroads have to wage a continual conflict against an arch enemy of transportation in the form of the poetic, beautiful snow. In some sections of the country snow seriously obstructs the operating of the roads for months, and largely increases the working expenses. There was a time in the history of American railroads when a heavy fall of snow entirely stopped the movement of trains, and engines were stalled securely in the round-houses till the snow melted or was deliberately shoveled off. These were *soft* times for railroad men. Now-a-days, however savagely the storm king may hurl blinding clouds of snow-drift over the road-bed, human forethought, strengthened with sinews of iron, has an army prepared to take up the gage of battle. Heavy snow-storms are anticipated as calmly as the festivities of Christmas, and proper provisions are made to give them a proper reception.

PREPARING FOR SNOW BLOCKADES.

A famous novelist, whose Christmas stories of sleighing, skating, snow-frolicking and love-making are a feature of certain "Christmas numbers," once confessed that he wrote all such stories while sweltering through the dog days in the heat of summer, and that the scenes he conjured up gave him much comfort under oppressive temperature. The railroad preparations for fighting snow are carried on under similar circumstances. During the summer months, when business is light, snow fences are repaired, strengthened and extended; snow ploughs are rebuilt or overhauled and got ready for duty, and flangers are straightened up and put in working order.

A snow-storm is not greatly different in one place from what it is in another where it continues for about the same period, and the method of fighting its obstruction applies to all places alike. I have been snowed up helplessly on a railway in the North of Scotland, and I have battled through snow-drifts in Iowa and Minnesota, and the only difference I found was, that the American storm was most violent, and better means were provided for overcoming its effects.

FIGHTING ARMOR.

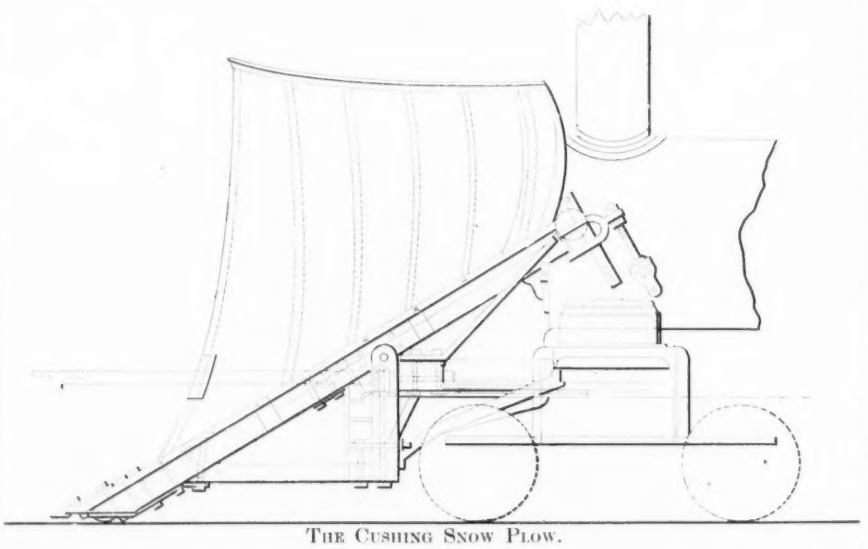
A snow-fall causes very little obstruction to railroads unless it drifts. A foot or two of undriven snow may fall, and the trains will keep moving quite regularly, the small pilot plows, brooms and flangers keeping the track open. Should a hurricane of wind accompany a heavy snow-storm, as is generally the case in the Northwest, the light snow is carried by the wind away for miles from all exposed ground, and deposited in every sheltered nook, railroad cuttings that cross the line of the storm becoming a receptacle for the snow from wide stretches of open fields. To partly protect cuttings that are particularly liable to be snowed up, close fences are erected on the edge of the right of way on the wind side of the track, and this provides an eddy from the wind where the driving snow settles, and does not reach the track unless the accumulation becomes unusually great. On the mountain roads snow sheds are used to keep heavy drifts away from the track in such places.

KEEPING THE ROAD OPEN.

The successful operating of roads in the bad snow-storm regions depends greatly on the sagacity and management of train men, and on the judgment of train dispatchers in perceiving the right time for moving or holding trains. While the fall of snow remains light, the policy usually pursued is to keep trains going, care being taken not to overload the engines. The trains passing over the track at short intervals serve to keep it open, but while following this method of operating, a sharp watch must be kept on the weather reports, or a sudden violent storm may stop a train in every cutting. When a storm commences which is likely to prevent trains from getting over a division, freight trains are generally all abandoned, and engines with heavy snow plows are run to keep the road open.

SNOW PLOWS.

The snow plow most commonly seen in use is an apron of sheet iron which is fastened outside the pilot and is kept there all winter. Plows of that kind are well adapted for light snow and they do not seriously interfere with the locomotive. For deep snow heavy plows are used, and they are only called into service to open the obstructed road or to keep it open where storms are frequent. Large plows fastened to locomotives render the engines inconvenient to handle except for special work. In some cases the large plow is an independent structure, having trucks to carry it and room inside for a conductor. The large plow which has proved most successful on northwestern roads is constructed similar to that shown in the engraving. The original design of this plow was made by Mr. G. W. Cushing, superintendent of machinery of the Northern Pacific Railroad, and it has met with great favor among railroad men. This plow is carried by the front of the locomotive to which it is securely braced. Steel shoes are strongly riveted beneath the point of the plow so that when a heavy snow-drift is struck the shoes slide on the rails taking the severe strain which otherwise would be thrown upon the engine truck.



THE CUSHING SNOW PLOW.

SYSTEMATIC PREPARATIONS.

On the Burlington, Cedar Rapids & Northern Railway, whose system of dealing with snow blockades is as good as any road in the country, a Cushing plow is provided at each end of every division. All the attachments for connecting the plow to the locomotive are kept with each plow, and they are made to fit all the standard freight engines. So soon as the weather reports at headquarters indicate that a division is likely to get blocked the superintendent orders the plow to be put on the first convenient engine and run over the road. Sometimes the plow is sent out to help a passenger train through; in other cases the plow engine is attached to one or two assisting engines. When locomotives are connected together to operate a snow plow the pilots are in every case taken off and "bull noses" bolted to the bumper beam to couple by. This precaution of close coupling is necessary because in plunging into a snow bank too much stress is put on a long pilot push bar, and should it break at that moment the engine would be likely to smash up the tender in front of it. Another important precaution never neglected here, is to see that the engineers starting out with a snow plowing cavalcade are all men of mature experience and good judgment. In no other species of railroad duty do these attributes prove so important.

During an unusually severe winter, snow accumulates in such masses that a "blizzard" raging for a few hours will obliterate snow fences and fill many deep cuttings level with the surrounding country. So soon as the hurricane abates "snow bucking" as they call it out West, is commenced from every available point. Each snow working train is put in charge of a train master or other experienced train man who follows his own judgment in working through the obstructions.

SNOW BUCKING.

The description of a turn of snow working which the writer took an active part in a few winters ago applies, with some modifications, to all operations of that kind as usually pursued on northwestern railroads. A division was badly snowed up, and two engines started out with a large plow to work toward others similarly engaged. We took along car accommodation for a gang of shovelers, and a supply of coal for the engines. The first serious obstacle we reached was a cutting about a quarter-of-a-mile long, filled level with snow to the top of the snow fences, the average depth being about ten or twelve feet. The shovelers were put to work cutting a straight face on the snow bank for the plow to strike upon, and deep trenches were cut on the surface of the snow at right angles to the track. We then backed with the two engines about a mile, to take a good run. In running at the bank the engines are worked to reach their highest possible speed. Just before striking the snow the links are dropped to full gear so that the engines will exert their full tractive force in advancing among the snow. Plunging into a solid looking snow bank that reaches nearly to the top of the smoke-stack tries the nerves of an engineer. But it is like jumping into a cold bath; hesitating on the brink is the uncomfortable part. So soon as the plow touches the snow-bank a dense cloud envelopes the engines, which makes the cab as dark as the heart of a tunnel. In doing his work the engineer must now depend entirely upon his hearing, unawed by the tumult of noises that accompany the engine's entrance among the frozen masses. Lumps of ice and huge cakes of snow thunder on top and sides of the cab; steam hisses and crackles from the hot surfaces being hugged by the densely packed snow; a whirl of slipping wheels makes every joint of the engine groan and clatter, but the engineer must grasp the throttle undisturbed by the dismal uproar. He must not be appalled by violent slipping, or attempt to check it, unless the engine is working water in a way to endanger the cylinders. This his trained ear can detect amidst the other noises. By the exhaust he can also tell the moment the engine has ceased to move ahead, and he immediately reverses and tries to back out. Sometimes snow is packed so firmly over the motion that the engine cannot be reversed till it is shoveled out.

EFFECT OF RUNNING INTO A DRIFT.

Those on the ground watching the effect of the run see immense masses of snow thrown out into the fields; the rapid speed is converted into a confusion of noises and snow missiles, then almost instantly the flying cavalcade stops. But the plow has cut a swath nearly three hundred feet long. The workmen at once swarm round the plow and engines and shovel out the snow embedded round wheels and running-gear. When the hind engine is got out, the track is cleaned out and the free engine helps to pull out that which has the plow attached. While the resurrecting of the engines is going on snow is shoveled into the tenders and melted by the injectors being used as heaters. So soon as both engines get out of the snow they are ready for another run, and the same cycle of work goes on till the obstruction is overcome. Where the snow is lighter, the engines will generally get through without stalling. They are also able to back out without shoveling, where the body of snow is not overwhelmingly heavy.

On some roads, three or four locomotives are sent out with every large snow plow, but snow bucking in that way is an intensely dangerous operation. Should anything go wrong a bad smash-up follows. Two engines running with the plow and one free, to pull the others out reaches the limit of safety.

ESSENTIALS OF SUCCESS IN SNOW FIGHTING.

The engines best adapted for this kind of service have great tractive power, and plenty of adhesion. The boiler is fed by good injectors alone. Pumps are an intolerable nuisance in working through snow. The ash-pan is generally taken down, which proves a great help in getting the engine out of the snow, and the brakes are best to be taken off the tender, for the beams and shoes are always a great obstacle where the snow gets so densely packed that it must be shoveled out. These conditions of the engine aid the work of opening the track through a snow blockade, but the supreme need for carrying on such work successfully is capable men, ready and willing to strive zealously in the arduous and dangerous labor of fighting the snow.

Leve & Alden, 207 Broadway, New York, have issued a circular of their regular winter excursion to Cuba and Nassau, New Providence. The party will leave January 26th, and return in the early part of March. The trip looks very inviting, especially for those who can spare the time to go, as the expense is made light.

Increase of Pay for Engineers and Firemen.

The Burlington, Cedar Rapids & Northern Railway Co. have agreed to give their locomotive engineers and firemen a substantial raise of pay, beginning with the new year. Passenger engineers are advanced from $3 to $3.15 per hundred miles, and freight engineers are advanced from $3.50 to $3.75 per hundred miles. One hundred miles or under will constitute a day's work. Several of the divisions and prevailing freight runs are considerably under 100 miles, but the company agree to reckon them as full runs. As the firemen were paid a proportion of the engineers' pay, they receive an increase proportionate to that given to the engineers.

Observations on Machine Tools.

A representative of one of the largest machine tool building establishments in this country sends us the following notes of observations made on a recent trip:

"While in Canada, a short time since, through the kindness of the mechanical superintendent, I had the pleasure of looking through a large R. R. machine shop, and saw a larger number of machine tools of English make than I suppose could be found in any other shop on this Continent. The larger machines looked very much like our American tools, only they have less finished surface and very little scraping that I could see, all the gearing being cast, and the feed and lead screws being cut with very coarse threads. To my eyes, the tools looked very unhandy and clumsy. Of course there is a great deal of the anvil principle, plenty of metal, but not applied to as good advantage as it would be in countries where iron costs more than it does in England. Sometime I propose to give my views on the anvil principle, which will not agree in every respect with some other views that have appeared in your valuable paper.

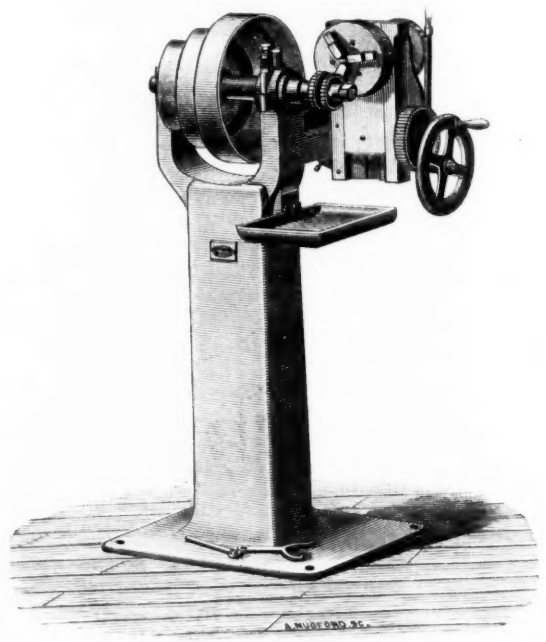
"There is a great difference between the English and the American small tools, and there are some good points that I think we might copy to advantage, but a great many that would not be as good as the ones we have. For instance, on a 12″ (what we would call a 12″) lathe, the tail-stock spindle was only 1″ diameter; the headstock spindle had taper bearings not any larger than would be used for a 10″ speed lathe here. This thing surprised me, as I expected to find all kinds of English machinery heavier than ours.

"I noticed in one part of the works a long double bed, on which were ten sets of head and tailstocks, also carriages—five on each side—having one screw on each side to actuate them. At each end of bed were uprights about ten feet high from floor, being connected together at the top by a stringer. To the latter were fastened hangers, on which a shaft the full length was run, having ten cones set to run over ten corresponding cones on bed. As the cones on shaft run loose (the shaft being kept running all the time), the cones would not drive the lathes until the operator would throw in the friction clutch, which, in this case, was a flange or head fitted to slide on a key imbedded in shaft, being turned on top to fit the inside of the largest step of cone, which is slightly tapering.

"In factories where a large number of machines of one class are used, it would be a good plan to build the machines on a plan similar to the above, as it would do away with a lot of countershafts fastened to the ceiling, which hardly ever are in line with the main shaft or the machines either. There would only be one belt connecting with the main shaft where there would be ten or more the old way, and of course the same number of pulleys. There would not be so many belts to keep in repair, and not so much chance for them to get caught and wound around other pulleys or the shaft. I have worked in shops where it was almost as much as a man's life was worth to put on a belt while the shaft was running, on account of the pulleys being so close together. I remember, when a boy, working in a sewing machine factory where for the space of fifty feet the shaft could not be seen, and it was an every-day occurrence for some belt to be caught, and sometimes pull down a counter-shaft. One day a counter-shaft from a large screw machine was pulled down and struck a man on the shoulder, and knocked him senseless. I know of a few shops in this country that have automatic machinery, where five machines are run from one counter-shaft—but to stop one you have to stop them all. I do not doubt that there are some machines driven like the English ones mentioned, in this country, but there are not as many as there ought to be."

We clip the following from the Rochester (N. Y.) *Democrat and Chronicle* of Dec. 25:

The machine shop of J. S. Graham & Co., at 146 Mill street, was the scene of a pleasant affair last evening, which spoke louder than words, of the pleasant relations existing between employers and employes. Just before leaving work, George H. Graham, in behalf of the employes, presented John Kane, the junior member of the firm, an elegant Maltese cross. The recipient responded in a few appropriate remarks; and, in his turn, in behalf of the employes, presented Hon. James S. Graham, the senior member of the firm, with an elaborate Grand Army of the Republic badge, which is a beauty. Both of the presents were manufactured to order by Ettenheimer & Co., and are a credit to that popular firm. After the presentation, the employers invited the men into the office, and gave each man a fine turkey. Each of the apprentices was presented with a paid subscription to the AMERICAN MACHINIST for one year.



SLATE'S NUT AND BOLT HEAD MILLER.

Classification and Arrangement of Patterns at the Texas and Pacific Railroad Shops, Marshall, Texas.

BY C. R. C.

In the motive department here there is a large room designed especially for patterns. In it there are twenty stands 4x8 feet on the floor and eight feet high. Each stand has four shelves, and both the stands and shelves are numbered. Thus the stands run from one to twenty, and the shelves from one to four. On this road there are several kinds of locomotives—the Baldwin, Rogers, McQueen and others—and, if some system was not employed to keep the patterns separate, there would be lots of trouble. After various experiments to find out the best way, C. R. Holmes, Jr., the draughtsman, who had charge of the patterns and pattern-makers in this department, adopted the following. I do not know that there is anything very original in the scheme, but it is the best arrangement for the classification of patterns that I have ever found.

It is as follows:

As soon as a pattern is finished it is brought into the draughting room, where it is to receive a letter and number. Let us suppose it is a cylinder head for a Baldwin locomotive. The draughtsman consults his catalogue, and finds that the last entry was as follows:

"B 127. Bald. ecc. strap; stand No. 9; shelf No. 3."

Then he makes the next entry thus:

"B 128. Bald. cyl. head; stand ——: shelf ——."

In the catalogue there is a column for weights and one for remarks; for instance, if any loose pieces belong to it, or if it will answer for any other class of engines.

The "B 128" is then put on the pattern in raised letters, when practicable, so that the castings can be easily identified. If the raised letters and figures cannot be put on, the letters and figures are neatly painted on with a marking brush, or stamped on with steel letters and figures. The core boxes are stamped with the same number as the pattern. The patterns are varnished black, with red core points; and if there are any stop-off pieces on them, they are given a coat of clear shellac, which is a great help to the moulder.

Well, having been christened, the pattern is sent to the foundry, with the number of pieces wanted chalked on it; also a written order is sent to the office, as the foundry is a separate institution from the railroad. The draughtsman, on looking over the stubs in his order-book, can tell just when a casting was ordered, and, as they are checked off when delivered, he can tell at a glance whether it has been received or not.

When the patterns are brought back they are all carefully looked over, and, if any of them need repairs of any kind, or varnishing over, it is attended to, and if any of the loose pieces are missing, or any of the core boxes lost, they are looked up at once; and when everything is found to be in good shape they are placed away on their respective shelves for future use. They are arranged alphabetically, as nearly as possible, commencing with stand No. 1, and on the casting platform the same idea is carried out, which saves a good deal of time in looking for castings.

A Korting Condenser at Work.

At the Laurel Hill Chemical Works, Long Island, there is a Korting Induction Condenser connected with the engine running the works. The engine is 130 feet away from the edge of a dock, which was the most convenient point for getting a free supply of water. Partly as an experiment the condenser was erected at the edge of the dock, but it was scarcely believed a practical scheme to keep it working successfully there. When it was started up, however, it worked well, giving from 22½ to 25 inches vacuum. The condenser maintains this vacuum while raising the condensing water, by the exhaust steam alone, seven or eight feet. During a visit, that a representative of the AMERICAN MACHINIST recently made, to the establishment where this condenser is at work, the condenser was stopped so that a pipe joint could be tightened up. The engine missed the help of the vacuum immediately, and part of the machinery had to be stopped till the condenser was started. As the power required to operate the machinery is very irregular, the superintendent, Mr. Herreshoff, could not tell the amount of saving effected by using the condenser, but he was satisfied that the saving was important.

Mr. Forney's Attitude to Railroad Employes.

In taking farewell of the readers of the *Railroad Gazette*, among other sensible remarks, Mr. M. N. Forney, speaking of his editorial work, says:

"He has never assumed that railroad companies can do no wrong, nor has the authority to grant free passes been permitted to blind his eyes or pervert his judgment. Commendation of inventions, manufactures or persons has not been a commodity offered for sale.

"That employes in demanding higher wages were not always wrong, and that companies in refusing to pay them were not always just; and that among the rights of employes which employers are bound to respect, that of a fair hearing and consideration of such demands, when properly made, has always been insisted upon. Much time and discussion has been devoted to calling the attention of railroad managers to the dangers to which their employes are exposed, and to inducing those who control such matters to provide appliances which would diminish the risks of those for whom so few are ready to speak. That the State should establish an authority to stand between the public and the railroad companies, to see that there is fair play on both sides, is a doctrine that the writer has always advocated, and the need of having railroad accidents investigated by some competent authority, which would represent the interests of the whole public, has been pointed out again and again."

In the councils of railroad men, among master mechanics and car-builders, Mr. Forney's voice has always been raised in favor of safety appliances. In this department alone railroad employes will miss Mr. Forney's influence, should his withdrawal from journalism include withdrawal from railroad associations.

Slate's Nut and Bolt Head Miller.

This machine is especially adapted for straddle-milling all forms of nuts, bolt and screw heads and slotting screws, taking in bolts of any length, and up to 1¼″ diameter, The bolt is held in a special "Horton" chuck, and changes for different sizes of heads are made very quickly. Each machine is furnished with one pair of cutters, suitable for all operations except slotting screw heads; also with the necessary collars for making adjustments for sizes from ¼″ to 1¼″, inclusive. Countershaft and all necessary fixtures to adapt the machine for immediate use are furnished.

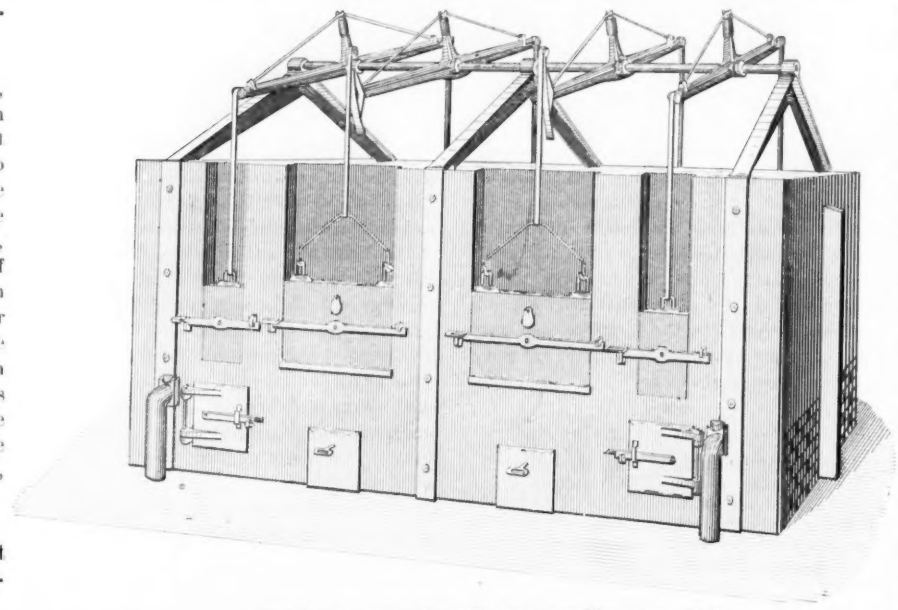
Being designed expressly for the purposes named, this machine is always ready, no changes of fixtures being necessary. Having no other purposes to provide for, it has been arranged and constructed for its special use with regard to strength, ease of manipulation, and rapidity of work.

It is made by Dwight Slate, 262 Main St., Hartford, Conn.

A mechanical absurdity recently announced is a steam engine with two curved cylinders. This, of course, requires curved pistons and rods which are connected to cross heads that are required to transmit the power on a straight vertical plane. The obstacles to this are overcome by a complicated mechanism having some relation to a parallel motion. If the intention of the inventor was to see how complicated he could make a simple machine, he has been tolerably successful, but if it was to make a steam engine for practical use it is difficult to see that he could have more effectually contrived how not to do it. This engine will probably be described as of "simple design."

The Brown & Sharpe Annealing and Case-Hardening Furnace.

The engraving represents this furnace, which is quite similar to that illustrated in our issue of May 12, 1883. An improvement has been made in raising the oven floor to two feet above the ground line, making it more convenient for handling small pots. The size of the oven is 4 feet 3 inches in length, 2 feet in width and 1 foot in height. One of these furnaces can be run with a consumption of 150 pounds of anthracite coal per day for one oven, or 125 pounds each for a double oven. This is when run continuously, with capacity for hardening 100 to 400 pounds per day, according to the character of the work. These furnaces are made by the Brown & Sharpe Manufacturing Company, Providence, R. I.



ANNEALING AND CASE-HARDENING FURNACE.

Improved Universal Rip and Cross-cut Sawing Machine, and Universal Woodworker.

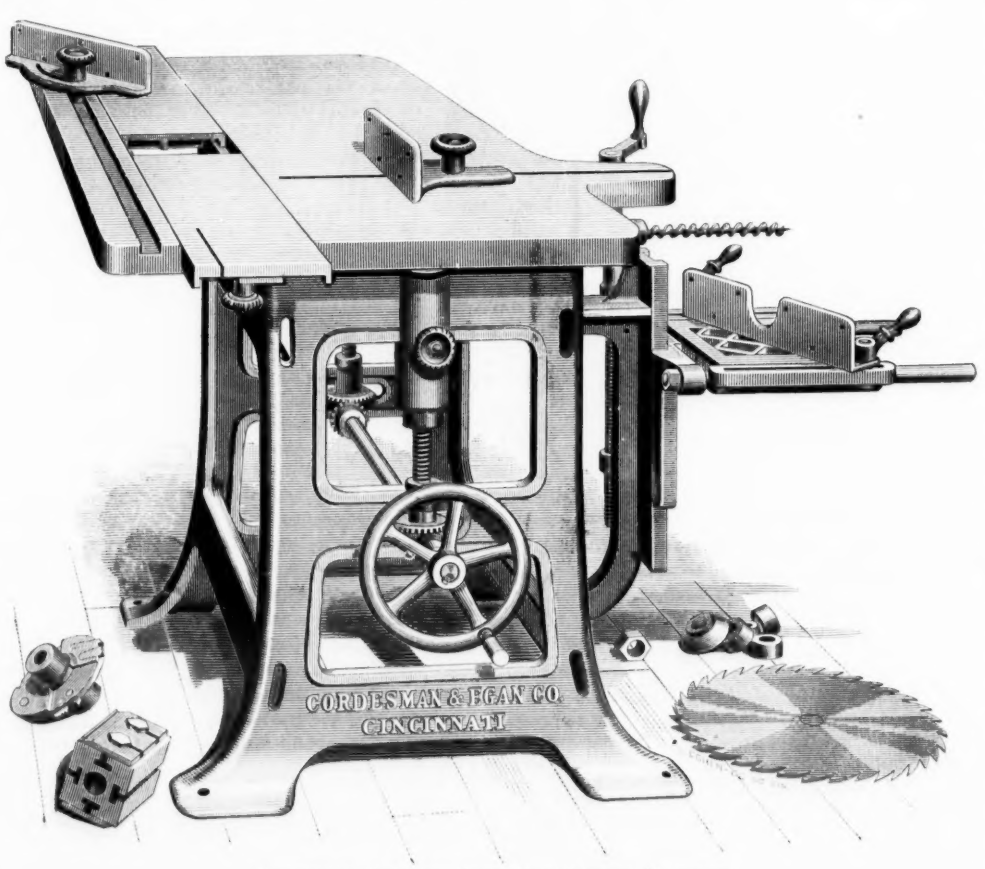
The engraving represents a machine of this class, made by Cordesman & Egan Company, Cincinnati, O. The frame is of iron, cast in one piece, and fitted with an iron table which can be moved on suitable ways. The mandrel is of steel, with self-oiling boxes, solid on the frame, and lined with babbitt metal. While this machine is designed for doing a large variety of work in planing, matching, boring, grooving, paneling, tenoning, &c., thus adapting it for all classes of woodworking, including pattern-making, it is particularly adapted for rip and cross-cut sawing.

For cross-cut sawing it has angles for cutting mitres and bevels; and for splitting, it will, by using a 20″ saw, split lumber up to 10″ in width, or, by turning over, up to 20″.

It can be used for planing and jointing stuff up to 5″ in width, and taking it out of wind. As a hand matcher, for box-making and similar work, it is a convenient machine, by the aid of an extra fence, making both tongue and groove without change.

The boring attachment is so made as to be adjusted independently of the main table, so that, when desired, two men can work on the machine at the same time without interfering, one with the other.

A variety of attachments are furnished with the machine, when required, adapting it to special varieties of work.



UNIVERSAL RIP AND CROSS-CUT SAWING MACHINE.

Boiler Construction, Setting and Management.

BY GEORGE MARSHALL.

The necessity of using only the best material in a steam boiler is not as generally understood as it should be, neither does it receive the attention it deserves. There are no shop tests employed by the boiler builder to ascertain the nature and quality of the material he uses; there are no mill tests to discover the defects in a plate before sending it to the user; and there are no tests required by local authorities to determine the safety of a boiler before it is placed in position, where, if defective, it may prove a source of danger to surrounding property, as well as to human life. Considering the great number of boilers in use throughout the country, the wonder is that so few explosions occur, especially considering the way in which boilers are frequently made. Where competition in prices is frequent and the contract is awarded to the lowest bidder, even though it is known that the price named will hardly pay the cost of material, all sorts of dodges are resorted to in order to make the work pay.

The specified thickness of iron is reduced one or more gauge numbers, and the quality of material is in some cases altered, even when the brand remains the same.

Instances are known where the accommodating mill-owner has stamped the plates to suit the consumer's wants, regardless of the fact that by so doing he virtually jeopardized human life, as well as deprived the honest builder of his privileges. The space between rivets is increased; the number, thickness and quality of braces are reduced, and the use of poor material is encouraged by the means of too close figures.

There should be a remedy for these matters; in fact, there is already a remedy, but the remedy is costly; hence it is seldom or never resorted to. If steam-users in need of boiler work would receive plans from a person competent to make them, receive estimates from builders of integrity, have the form of specifications prepared for all bidders alike, and then have a thoroughly-educated boiler-maker to superintend the construction of their work, the result would be a far better system of boiler-making than prevails at the present time. As was said before, this is costly, but if followed it would pay, and pay well in the end. Many large concerns have a consulting or superintending engineer, generally a man of mature years and sound judgment, and to him is intrusted the superintendency of construction, but the consulting engineer is not the best man for the work in all cases. He may have been educated at a time when work was done in a different and inferior manner to that of to-day, and retain to a certain extent the prejudices and theories of his youth; and, while he may be honest in his endeavors to see that everything is as it should be, he may yet fail in his efforts by reason of not keeping up with the age.

In boiler-making this is particularly the case, as the consulting or superintending engineer knowing nothing, or comparatively nothing, of the practical part of the business, gives his entire attention to the theoretical part, and the spacing of rivets or fitting of braces is carefully noted, while defects in construction pass unseen and unnoticed.

An old proverb says: "Set a thief to catch a thief." This can be correctly applied to boiler-making, and read: "Set a boiler-maker to catch a boiler-maker;" and even then you cannot always be sure that the watcher is not deceived.

Another important point to be considered in the purchase of a boiler is capacity. Without this point is fully considered and understood, the specifications of different builders will present such a contrast as to occasion surprise. Some builders, in a horizontal tubular boiler (the prevailing type) consider ten square feet of heating surface equivalent to a horse-power, and from that figure up to fifteen is the rule. This is including the full circumference of the tube for its entire length, or, in other words, "all that the fire and water come in contact with." Even the space between the tubes on both heads is figured up, as well as the entire shell below the point of support. For these reasons, the plan should be prepared by a competent man, and all who estimate on the work should do so from the same plan.

The plan of the boiler being approved and fully up to the requirements of the case, the thickness and quality of material should next be considered, and it would be advisable to specify the name of the mill, or of the owners, whose iron is preferred, as there is considerable difference in the nature of iron made at different mills. The diameter and pitch of rivets in single and double-riveted seams should also be given, and the style of braces and the number of same; also their distances between centers and the quality of material used in them. The caulking should receive great attention, as frequently boilers are seriously injured from bad practice in this respect.

Tubes and the manner of expanding them should also receive careful consideration, as even boiler makers disagree on the proper method of putting in tubes. The roller tool is now in general use, but many insist on the flue being beaded after rolling, regardless of the fact that every blow given after the rolling has a tendency to loosen the tube, as well as to crystallize the material of which it is composed. Again in a tube hole drilled for the use of a roller there is no chamfering of the sharp edge of the plate, and the boiler maker who does the work generally sets back the projecting end of the tube with his hammer, and the tube, generally of softer material than the plate itself, is subjected to a slight but serious injury by being hammered on the sharp hard substance. Experiments have proved beyond question that a tube properly rolled is capable of resisting all the pressure necessary before starting from the head, and even after starting the tube will not leak.

The question of expansion in tubes over and above the ordinary expansion of the boiler is a grave question, not at all considered, and should receive attention from scientific and inventive minds. A tube, say 3″ diameter, is less than an eighth of an inch in thickness, while the shell of the boiler is seldom less than $\frac{1}{4}$″—generally $\frac{5}{16}$″ and upwards. While it is true beyond question that the water in the boiler will protect the iron in the tube much better than the heavier metal of the shell, still the fact remains unchanged that the tube will heat quicker and expand more, proportionately, than any other part of the boiler. Copper packing and copper furrules are occasionally used in boilers to better allow for the expansion of the tube, as the copper virtually forms a soft elastic surface, and in this way allows expansion to take place without excessive strain.

The boiler being built and approved, care should be taken in the setting, as fuel can be saved or wasted in the brick work, as has often been proved. In setting a boiler injury has often been done by neglect of the party making connections with the engine, not taking into account the expansion of the steam pipes as well as the expansion of the boiler. Pipes are sometimes connected with the steam dome to form a rigid unyielding link between the dome and the steam chest, and the result is leaks of one or both joints, sometimes a break at the weakest point.

The proper proportion of grate to heating surface in a boiler is generally understood by all engineers as well as by practical boiler builders, yet a man will sometimes set his boiler and order his grates (perhaps try to make the old ones work) without in any way studying the relative proportions of one to the other. The chimney should play a very important part in the getting up of a proper plant, the size of that, in connection with the heating and grate surface being very closely connected, and unless they are studied as a whole, great mischief can be done, and great waste follow.

Steam gauges are injured, and rendered unfit for use, from being placed in such a hot position that the temper of the spring is

seriously affected; or that the connection between the boiler and gauge is not such as to insure the spring being acted upon by water instead of by steam, yet engineers will (when spoken to on that point) say that the gauges are steam not water gauges. The handling of a boiler, the source of the greatest waste or economy, is also to be considered and will receive attention in a future paper.

LETTERS FROM PRACTICAL MEN.

A Blacksmith's Forge, and Points in its Use.

Editor American Machinist:

I enclose sketches of a blacksmith's forge, which I have used with much satisfaction to myself, and I believe with profit to the proprietor. Fig. 1 shows a section of the forge and Figs. 2 and 3 detached views of the air chamber and tuyere iron, respectively. In these *A* is a boiler iron ring, 4 feet diameter and 2 feet 4″ in height. *B* is the air chamber and ash box, 2 feet 6″ in length and 9″ square in cross section. Into this box are openings, *D*, *D*, each 3″ diameter, and an opening 3″ square in the end. *F* is the tuyere iron, of wrought iron, 9″x9″x9″, with an opening, *C*, 1¼″x2½″, starting in the center and running through at an angle, as shown in Figs. 1 and 3.

J is the blast pipe, 3″ diameter, bolted to the opening, *D*, in the air chamber. *H* is the fender or sides, made of sheet iron 12″ high and bolted to the boiler ring so as to stand away at an angle of 45°. *I* is an opening in back side of fender, for admitting a long shaft. This hole is covered with a movable door.

In selecting a site for the forge let it be at least 3 feet from any wall, so as to permit long bars to be heated, and provide for handling heavy work. Have the light come from in front or side of the smith—never from the back—as nothing is more annoying than to stand in one's own light. Provide ample room for the helper to swing his sledge without danger of contact with something or some one.

Having selected the site, place the ring in position, the air-chamber inside and the tuyere iron on the air-chamber so that the openings will coincide. Fasten the tuyere iron with keys driven between it and the cleats, *E*, *E*, on the air chamber. These cleats should be at an equal distance from the opening, *D*, and 10″ apart.

Next get a straight edge across the top of ring and locate the center of opening in the tuyere iron 18″ from the front of the fire, 9″ below the top and centrally from right to left. You can now readily get the position of opening for blast pipe, and the 3″ square opening for removing the ashes from air chamber. After cutting the holes bolt the flange of blast pipe to the air chamber.

You now fill the ring with sand or loam to a line running from 6″ of the top of tuyere iron to 6″ from the top of ring. On this you pave with two courses of brick, using fire brick around the tuyere iron. Now you are ready to connect a valve and suitable rigging. Not any kind of a trap that goes by jerks, but a slide valve that moves freely and smoothly—one that will shut off completely and remain stationary at any point.

Fig. 4 represents the smoke stack and bonnet, which should be suspended, by rods, over the center of the forge. The stack *L* should be 18″ diameter, and the bonnet *K* 3 feet diameter. The bottom of the bonnet should be 3½ feet from top of the ring.

Everything is now ready for the fire on top of the tuyere iron, having made which, fill the hearth with fine bituminous slack, put on the blast and note the result. You find that the tuyere iron is at the bottom of the nest, and that the slack has a natural tendency to gravitate towards it; also that the portion of the fuel that is on fire is burning with a beautiful white flame, while right around the edge of this is the slack, apparently cold. The fact is we have here employed all the principles of utilizing fuel that have lately done so much for iron and steel making. The hot, open fire in the center liberates the gas in the surrounding fuel, which in escaping through the hot coals is ignited, bringing about perfect combustion just where it is required; in fact we have a Siemens-Martin furnace without the expense of a gas house and combustion chamber. The fire can be made of any size desired, by opening and cleaning and regulating blast.

When the fire gets dirty lift the cinder from the top of the tuyere iron, move the surrounding hot coke to the center, fill around the outside with fine slack and you are ready for business in less time than it takes to tell it.

This can be done with any bottom blast tuyere iron, but not every blacksmith does it. How often we see the blacksmith manipulate the fire so as to force the combustion to take place above the fire, burning his face; or using sand on all welds, not being able to get sufficient heat to make a weld without.

The object of the air chamber is to make a base for the tuyere iron, provide for removing ashes that may fall through the opening in the tuyere iron; also to conduct the blast to the tuyere opening. The tuyere iron is made large to prevent getting too hot, and to retain the heat when the blast is off. It absorbs heat from the fire, but not so as to get red hot, as is the case with small ones. It retains the heat, so that when the blast is put on the air is heated in passing through it, thus assisting combustion. The blast opening is made at an angle, or between the directions of the bottom and side blast. It has the advantage of spreading the blast when a large fire is required, and avoids wedging of the ashes when the blast is shut off. Ashes that pass into the air-chamber can be removed through the square opening in the end, an operation that will only need be performed about twice a week. The opening can be stopped with a wooden plug, or by any other suitable device.

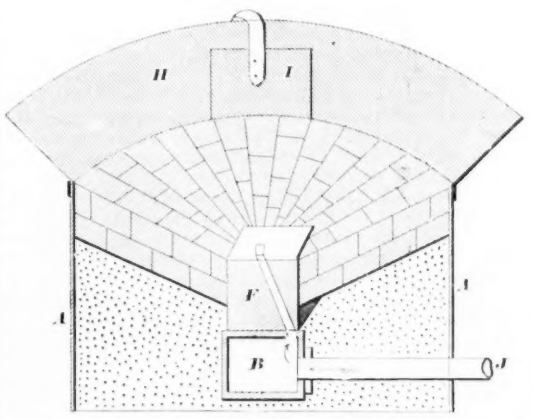


Fig. 1

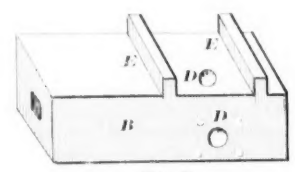


Fig. 2

Fig. 3

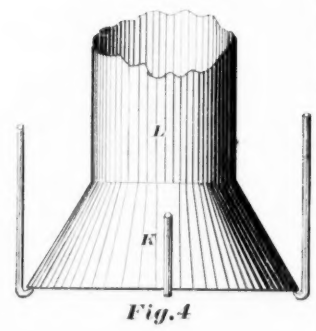


Fig. 4

BLACKSMITH FORGE.

The hearth will hold about ten bushels of slack, and should be kept nearly full, thus keeping the sides covered and avoiding the reflection of heat from them into the face of the operator.

The position of the stack places it above the head of the smith, permitting him to see his fire and heat without stooping. The distance between the bottom of the stack and the fuel, when the hearth is full, will be about two feet.

To those not accustomed to using a bottom blast tuyere the natural query is: What prevents its burning? Some will say it is the blast that keeps it cool, while others will advance other theories. It is sufficient to know that with fair usage it will not burn. Care should be taken not to dig the brick work away around the tuyere, so that the fuel can get below the top of it.

Pittsburgh, Pa. JOS. H. GARTSIDE.

Old Patents and Official Examinations.

Editor American Machinist:

The letters in your paper concerning old patents repatented remind me of a little experience of my own.

In 1872 I patented a certain device. In 1875 I undertook to overhaul a man who had just patented the same thing. He overhauled me in return, and showed me a patent of 1867 that got ahead of us both. I would not give a nickel for all three patents now that I know that the device is shown in several foreign patents of many years ago.

This trouble is not new, is a part of our American system, and goes a great way to prove that our official examination (?) is a farce and a fraud.

The inventor must understand his subject, and make his own examination any way, before he can enforce his rights. Why not give him a simple certificate that he has filed a description and complied with the law, give him such *advice* as to novelty as the office has at hand, and let him fight his own battles?

The examiner cannot for the price charged, and he certainly never does, make the pretended expert examination, and nothing else can possibly give a secure title.

The present English system is superior to our own in many respects, and it would not be difficult to improve on both.

GEORGE B. GRANT.

Good Work of a Small Engine.

Editor American Machinist:

I am not sure but we have the smallest engine to be found running a foundry and machine shop, but you can judge from the following particulars: First, we have a 28″ cupola, for which we use a 24″ five-bladed fan; blades, 5″x7″. This we run 1,400 revolutions per minute.

In the machine shop we have a 21″x12 foot lathe, a 6 foot by 24″x24″ planer, a 36″ drill; also a small drilling machine and an emery wheel and grindstone.

We have taken off a 4,500 hundred heat in three hours, with nut coal as cupola fuel; with stove coal and good pig we can melt four tons. Our work is railroad contractors' supplies and boat work, the largest casting weighing two tons.

This work we do with an engine 3″x4″, running at a piston speed of 300 feet per minute and boiler pressure of 50 pounds. It is an engine we built for a yacht, regular marine type, with link motion, and does the work entirely satisfactorily, never slowing down except when we take the tuyere cover off to clear out the wind passage. I should have supposed it would be quite the reverse of this, and should be pleased if some of your readers would give a reason for it.

Port Arthur, Ont. T. A. W.

Steamship Inconveniences.

Editor American Machinist:

Very few of your writers seem to note the inconveniences which might be overcome by a slight amount of extra thought by the constructing engineers of most of our steamships. They appear to think, so long as the engine presents good workmanship, and their plans are properly carried out, nothing more is to be done; but, let that same man make one or several trips on the steamer, and he would see many things which are invariably forgotten when the vessel is said to be finished, and which never get into her afterwards.

Take, for instance, the railway on which the coal-buckets run. I never, as yet, have seen one of these ways which had a fall, say of six or eight inches in its length, which would cause a loaded bucket to roll from the bunker, with no extra exertion on the part of the coal-passer, that was not always parallel with the keel of the ship, and nine times out of ten the bunker opening is in the after end of the fire-room, with the ship slightly down astern and the hard-worked coal-passer tugging and pushing to get his bucket to the middle furnaces. The result is many changes of the men, which cause no little trouble; and, what is more, she is called a hard-working ship, simply because she is inconvenient.

At some future time, I will give you an idea of crank-pins and journals.

THRUST.

Small Shops.

Editor American Machinist:

In a recent editorial article you gave some good advice to young men who are learning the trade in small shops. I know how to sympathize with these young men, having been there myself. I was always glad when a new journeyman came in, so that I could question him about how things were done in large shops. Their accounts of fine tools and great facilities for doing work were, generally, such as to make me more anxious than ever to see these things for myself; and I bewailed the fate which had placed me in a small shop.

But I served my full time, and remained some months afterward to replenish my wardrobe and get a little accustomed to the responsibilities of a journeyman amongst old associations.

My first change from the old shop of fifteen men was to go into a shop with 600 men. To say that I "felt like a cat in a strange garret" would be a feeble comparison. In looking through the shop, the great number of vertical belts and shifters reminded me of the forests of my native hills, and I almost wished myself safely back amongst them. On going to work, however, I soon found that the quantity of tools had nothing to do with the principles of their application. Lathes, planers, drill presses, turning tools, drills, hammers, and chisels being multiplied did not open up any new fields of usefulness: they remained simply tools for special purposes, and these purposes were just the same in a shop of fifteen men as in a shop of 600 men. But I did find that when the uses of these tools were divided up amongst 600 men instead of amongst fifteen men, the general knowledge concerning them was sometimes rather thin—in spots.

There was one lathe, such as I had never thought of before, made expressly for turning balls. I did not spend much time in its examination, as I had turned a great many ball valves and other balls, in a common chuck lathe with a hand tool.

With the gear cutters it was different. There was no gear cutter in the old shop; here there were two. As soon as I could I made the acquaintance of the two men who ran the gear cutters. They were very kind, and explained the operations; but when I asked how they knew what size to make a blank for a certain number of teeth, they could not tell me. I would have to see the man who turned up the blanks. I saw the turner; he could not tell how many teeth were to be put into any blank—he only turned to such sizes as were given him. I inquired of other workmen until I got ashamed of it, and then dropped the subject.

Three years afterward, the foreman of a small shop where there was no gear cutter told me the rule for sizes of blank, just as it is in the AMERICAN MACHINIST in answer to question 295, 1883. But at that time there was no AMERICAN MACHINIST of which I could inquire. In a small shop the learner can, if he will, observe all the separate operations which go to make a whole, complete machine; but in a large shop the whole machine is seen by but few men, and they are not the apprentices. OLD JOUR.

Condition and Prospects of the Machinery Business.

LETTERS FROM LEADING MANUFACTURERS TO THE AMERICAN MACHINIST.

The Pratt & Whitney Co. (Machinery and Tools), Hartford, Conn., write us:

As to present condition of our business we beg to state that we keep 525 men well employed 9 hours or more per day. Our stock of finished machine tools is not more than one-half what it should be to enable us to fill average orders promptly, and we often have to ask intending purchasers to wait a few weeks for tools that we try to carry in stock. We expect a fair business for 1884, and hope to accumulate an assortment of the machines commonly wanted. Our shipments during 1883 fell behind those of 1882 only seventeen (17) per cent. in value.

Poole & Hunt (Founders and Machinists), Baltimore, Md., write us:

During the greater part of the year 1883, our establishment has been fully employed, frequently running nights. Within the last six weeks, orders have fallen off, and a small reduction in force has been found necessary. Materials are lower in price, but no reduction has been contemplated by us in wages. Our plant has been enlarged and improved, and we are better prepared than ever to turn out a large amount of good work in our line, with promptness.

The Hancock Inspirator Company (Inspirators and General Jet Apparatus), Boston, Mass., write us:

Our business for 1883 has been equal to that of 1882, and in some respects an improvement over that year. We have now sold over 50,000 inspirators, and a few days since we stamped our sixty thousandth inspirator. This, in addition to our sales of ejectors, etc., which is a rapidly increasing trade. We are now erecting a factory building from plans made by N. J. Bradlee & Co., of this city, architects. The main building will be 175x36 feet, four stories high, and a foundry building 36x50 feet, two stories high, with other additions for boiler-house, etc. This factory will be one of the most complete and substantial buildings of its class in this country. It will be located on Baldwin Street, at the south end, near the Chickering station, on the Boston and Providence Railroad. We hope to occupy this factory early next summer.

Lodge, Barker & Co. (Machinists' Tools), Cincinnati, Ohio, write us:

We have been enlarging and extending our business from the first day of 1883 to the last, and so far as we can see the prospects for 1884 are O. K. We moved into our new building August 1st, 1883. It contains 15,000 square feet, and is filled with the best tools produced in the United States, from different makers. We can say that our orders keep fully up to our capacity to fill them, and we are to day employing more men than at any other time since the firm organized. We are centrally located, and ship our product in about an equal ratio East, West, and South. We appreciate the value of the AMERICAN MACHINIST as an advertising medium, as you will have noticed by our steadily increasing the amount of space for our "ads." We wish your journal a continuance of its splendid success.

The American Steam Gauge Co. (Gauges, Indicators, Planimeters, etc.), Boston, Mass., write us:

Our business for the year 1883 shows a very great increase in all departments. Our regular gauge department will show a much larger product than that of 1882. The sale of our Thompson Improved Indicator has increased steadily, and the quarter ending December shows *almost double* the number sold than in any previous quarter. Engineers of all ages, from twenty to sixty years, are interesting themselves in learning its use—thanks in a large degree to your paper—and the present outlook for 1884 indicates a still greater sale of indicators than that of 1883. We have had twenty years' experience in the manufacture of steam engine indicators, and the present activity shown by engineers to acquire its use is surprising.

The Yale Lock M'f'g. Co. (Manufacturers, Engineers, and Machinists, and proprietors of the Emery Scale Company), Stamford, Conn., write us:

The year 1883 has been one of moderate activity in most of our lines of manufacture, and of great activity in others.

In our lock department our business has been during the past year somewhat above the average, and orders have continued rather beyond our expectations. We consider from present indications that the year 1884 will show an improvement in this line.

In our crane department our orders have been beyond our ability to supply. That such was to be the case became evident early in the year, and we have found it necessary to erect a new machine shop 80 feet by 300 feet, which was completed in June, and has been more than occupied ever since. We have also completed a smith shop 60 feet by 120 feet.

In our department of scales, gauges, and testing machines, under patents of A. H. Emery, work is progressing satisfactorily. We have completed some 75-ton hydraulic testing machines, which are now ready for the market; and we are also ready to supply railway track scales, and also have some warehouse scales, and also some pressure gauges in a forward state.

Altogether, so far as we can judge from our own case, the outlook for 1884 is bright and likely to be succeeded by still better times after the political situation becomes more settled.

The Taylor Manufacturing Company (Engines and Machinery), Chambersburg, Pa., write us:

Our trade for the year 1883 has been very good, although for the last two months has fallen off somewhat. Our prospects for an increased trade in 1884 are very good.

The Watts, Campbell Company (Steam Engines), Newark, N. J., write us:

The past year has been one of increased activity, and the volume of business has been larger than that of preceding years. While lower prices for materials have prevailed, skilled labor has firmly held its own, and first-class mechanics are difficult to obtain; and the substitution of labor-saving machinery has become more than ever an absolute necessity. We have increased our plant in many respects, and propose to make a number of additions and changes during the year 1884 that will further increase our capacity, and enable us to turn out more and better work, the market demanding the best that can be produced. At the present date we are full of orders, and our prospects for the year 1884 are very encouraging.

F. E. Reed (Machine Tools), Worcester, Mass., writes us:

During this year I have built a new and substantial brick shop 180 feet long, and 55 feet wide, with two floors and basement specially adapted to the manufacture of Machine Tools, and have added new and larger tools, which gives me double the capacity of last year. I have made a complete new set of patterns for engine lathes from 10 to 26 inches swing, and have added to my working force from time to time, and now have more help at work than ever before.

I have been favored with a good year's trade, and a constantly increasing business. There has been no material change in the price paid for first-class labor.

Brehmer Bros. (Engineers and Machinists), Philadelphia, Pa., write us:

During the year 1883 we have been kept very busy, and the prospects are that in the coming year the orders will by far exceed our present capacity.

Our new acquisition, the Bevel Gear Cutter, promises to open a special branch to our business; orders for cutting are coming in more rapidly than we are able to fill them, and, as far as we can ascertain, our customers have been well pleased with the work accomplished by this new invention.

The Ball Engine Company, Erie, Pa., write us:

During the year 1883 we brought out our Automatic Cut-off Engine which has met with uniform favor owing to the great novelty of our governor in holding an engine to full speed under full changes of load.

Our facilities have not been adequate to the demand, having been obliged to refuse some fine orders. We have about completed our arrangements for building new shops to meet our increasing business, as we stand alone in perfect governing.

The Betts Machine Co. (Machine Tools, Standard Gauges, etc.), Wilmington, Del., write us:

We think we have no cause to complain of our business for the year just closed. Our works have been kept busy on ordered work. We have accumulated but a very limited amount of stock, and have been compelled to run a good deal at night to complete our contracts on time. The volume of our business is just about the same as it was in 1882.

That part of our product consisting of standard gauges and adjustable reamers continues to grow in favor both in this country and abroad, and we feel much flattered by the progress it is making. We now have in use over 25,000 of the gauges, made since the business was moved to Wilmington, and the cry is still for more. We now have in the printer's hands an enlarged illustrated catalogue which will be issued in a few days. Just at this season orders for machine tools are being placed slowly, and the general depression in the iron industry of the country is being felt by the tool makers.

The Gardner Governor Company, Quincy, Ill., write us:

The closing of our books this month (December) will show the largest year's business in the history of the concern.

Our steadily increasing trade has compelled us to erect new buildings, covering an entire half block in which we are now located, with facilities enabling us to cheapen and improve our work, and with almost double the capacity of the old works.

While we do not expect to be crowded with orders, we have every reason to anticipate a prosperous year, having already closed contracts for over two thousand governors, with more to hear from later in the season.

Everything indicates a healthy condition of affairs, and we are more than satisfied with the outlook.

C. W. LeCount, (Lathe Dogs, Machinists' Clamps, &c.,) South Norwalk, Conn., writes us:

Business is not as good as it was a year ago, though it is fair. I am running with a reduced force eight hours a day, and have no difficulty in keeping up with orders, though from all accounts business is likely to be better after the beginning of the new year.

The Craig Double Sight Feed Lubricator Co., Lawrence, Mass., write us:

The outlook for our business is very flattering. We are now running to our fullest capacity, and shall double our present product this coming spring or sooner. We have not missed receiving one or more orders in a mail for the past ten days, showing that buyers will buy the best, everything else being equal. We make three classes of lubricators with different prices, and can suit any class of trade. Our Sight Feed Lubricator for steam pumps, is the only one now on the market that is especially adapted to that use.

Forbes & Curtis (Die Stocks, Ratchets, &c.,) Bridgeport, Conn., write us:

At this time last year our tools were undergoing great improvements, and our workmen numbered six. (6). The improvements in our machines have been so well received that we are to-day working twenty-five (25) men, and if we filled all our orders we would be without a single article for sale, and we have orders yet to fill.

We have added about $10,000 worth of tools to our plant during the year. We are working into the foreign trade, and are now making up stocks for Australia and England, our goods being selected by a commissioner sent out from New South Wales, as just what was required. Material is cheaper than at this time last year, and the feeling seems to be that wages will be lower, but we make no change in our pay roll. Our agents report the prospects for sales in January will be far ahead of the same month last year, and we feel sure that this new year will be to us in every way satisfactory. We are about placing several new sizes of our stocks on the market, also several small articles, which, if properly placed before the public, will keep us very busy.

The Westinghouse Machine Company (Steam Engines), Pittsburgh, Pa., write us:

We inclose you some sales slips from June to October inclusive, which will give you some indication of the thriving condition of our business.

Our engine was first put on the market in May, 1882, at which time we had about forty engines in operation.

We expect to enter our seven hundredth order this week.

We can only say that our business has shown a steady and healthful increase during the past year, reaching a maximum in October, although the months of November and December showed only a slight falling off, which loss we expect at this season of the year.

Our shipments average from fifty to seventy engines a month, or practically two per day, and cover every State and Territory in the Union.

Notwithstanding the general complaint of dull business, accompanied by a reduction of time, force and wages, the increase of our business has compelled us to enlarge, and to add from time to time new tools and to resort to more or less night work.

At present the amount of inquiry is all that we could ask for, and we must report ourselves as looking to 1884 with sanguine anticipations.

The New Haven (Conn.) Manufacturing Company (Machinists' Tools) write us:

While the volume of our business for 1883 is considerably less than for the previous year, we find, upon investigation, that the cause is mainly due to the reduction in prices, our output of machinery being nearly as large as in 1882. While we have made no very important addition to our buildings during the year, we have been increasing and improving some portion of our numerous machinery, and have been constantly adding to the efficiency of the tools made by us, improving them in every possible way; and it is to that fact that we attribute the very good demand that we have for our tools at this time, when we hear of a general complaint of dullness in most kinds of business. We consider our prospects for 1884 to be very fair.

The Stearns Manufacturing Company (Steam Engines, Boilers and Machinery), Erie, Pa., write us:

With regard to business for the past year, the showing is only partially satisfactory. We have had during the season our share of the feast, and our share of the famine—or, we might say, of the reaction which has succeeded the booming time. Up to August, our business was the heaviest ever done by the establishment: since then, has dropped to half rations, *i. e.*, eight hours' time with reduced force. The boiler and engine trade, however, has been good throughout the year, but our heavy saw-mill trade has stood the brunt. New orders for large outfits are scarce, and must be taken at low figures. The tendency toward the use of improved machinery has, however, been very marked, and the modernizing of old "plants" has afforded considerable business. We find that in dull times we sell the best machinery. Purchasers cannot afford to waste time and stock when margins are close. We know we cannot, and looking ahead for such times as are now upon us we have gradually replaced with the best tools attainable all the old "time wasters." As to the future, without being optimists and allowing our hopes to delude our judgment, we will frankly say that the prospects are good. Inquiries are plentiful, but we see also that close figuring is necessary all around. We believe that 1884 will be a fair year. The advertisement placed in your valuable journal has induced quite a number of inquiries, and consequent orders.

Wm. Baragwanath (Feed Water Heaters), Chicago, Ill., writes us:

On the whole, the business of 1883 has been very satisfactory, and I consider the outlook for '84 to be quite favorable. Labor is about the same as a year ago, and materials slightly lower. Margins are a trifle lower, but the volume of business is good.

The Boston Blower Company (Blowers, Exhausters, &c.,) Boston, Mass., write us:

Since we moved to our new works at Hyde Park last June, we have been very busy with all the men we have tools, &c., to accommodate.

Besides the regular lines of blowers and exhausters for which there is a steadily increasing call, we are busy upon our new special pulley turning machines, boot and shoe machinery, tack and nail machines and other work.

We have lately, been running till 10 P. M., and have prospects of plenty of work ahead, though would like to see prices a little higher.

The Lambertville Iron Works (Steam Engines and Machinery), Lambertville, N. J., write us:

The general depression has affected the volume of our business to some extent, but, taking the circumstances into consideration, we have not had reason to complain. Inquiries for steam engines are now more numerous, and we think there is a prospect of great improvement in trade during the coming year. Our reorganization into a stock company and the completion of many improvements in our works have greatly increased our facilities, while the constantly increasing success of our patent automatic cut-off engine promises a more than corresponding increase in our business.

Sterling Elliott (Special Machinery), Newton, Mass., writes us:

My business the past year has been all that could be desired (thanks to a credulous public). My material was wisely purchased on long time, the product sold mostly for cash, which is judiciously disposed of. As to the outlook for 1884, I have some orders on hand, but for obvious reasons details are withheld. As long as the AMERICAN MACHINIST and other journals will continue to print my advertisement there is reason to hope for an occasional bite, as there are always some who will buy *anything*. If I don't turn out a large quantity of work this year (1884) it will be the fault of parties who hold a mortgage on my tools, and not mine.

The Willets Manufacturing Company (Jewelers' Machines and Tools), Providence, R. I., write us:

Our business for 1883 has been larger than ever before, notwithstanding the jewelry business, on which we depend to a great extent, has been very quiet. We have increased our facilities by adding several new machines, and are prepared to do 25 per cent. more work than ever before. About three months ago we added to our list tack machinery, and now have about two months' work ahead on this, in addition to our regular work. We also expect to bring out two or three new machines for special work during the year. From the present standpoint our prospects for the year 1884 look very encouraging.

The Billings & Spencer Company (Drop Forgings and Drop Forged Tools), Hartford, Conn., write us:

Our business for the year 1883 has been all we could desire. Our sales have been much larger than for the year 1882. We have added to our machinery, both in the drop-forging and finishing departments, and have added a number of specialties to our list of finished machinists' tools. We have orders on hand that will keep us running full time for the next four months.

C. E. Lipe (Milling Machines and Special Machinery), Syracuse, N. Y., writes us:

My business for 1883 has been fair, but not as large as in 1882. Have increased my facilities somewhat, to be in readiness to meet future requirements. Prices have started downward, but do not think they will go far. Have confidence in the future.

E. Gould & Eberhardt (Machinists' Tools and Special Machinery), Newark, N. J., write us:

During the year 1883 we have had a good share of work—mostly from old customers and some new—extending all over the globe. Our new tools are meeting with favor wherever they have been placed. During the past year we have added many new tools to replace old ones sold, and have not got through yet. We have built seventeen of our new universal automatic gear cutters, and our mechanics are beginning to see the importance of the merits of this, our new tool. Our patent shapers are likewise appreciated by all who use them. Their weight has been materially increased. We have a number of orders on hand, and we are hopeful of a good trade for 1884.

Joseph B. Matthews (Steam Engines), Baltimore, Md., writes us:

During the year about to close business has been good, continuing to increase steadily.

I am glad to note some additions, which, with a reorganization of forces, increase the capacity of my establishment about double. I think I am prepared to usher in a new year with very flattering prospects.

The American Twist Drill Company (Emery Wheels and Tools), Meredithville, N. H., write us:

We have made additions to our tools during the past year, principally for the increased manufacture of Bacon's patent independent chuck jaws.

The genuine merits of these useful tools are now generally acknowledged and appreciated; consequently, their sale is rapidly increasing, and prospects are good for large business in this specialty during 1884. We are also looking for a fair business in our other lines of tools—grinders, emery wheels, etc.

W. C. Young & Co. (Lathes and Tools), Worcester, Mass., write us:

As to business for the year past, we have had no reason to complain, as we have kept our regular number of men at work ten hours a day, and sold (not consigned) all they have made. We have brought out several new styles of lathes during the year, and have made improvements in our other tools that have been appreciated by the trade, judging from comments made and orders received at this time. We have orders booked to keep us running well into February, and expect to do a fair business in 1884.

Boynton & Plummer (Shaping Machines), Worcester, Mass., write us:

Our business the past twelve months has been very satisfactory: in amount about the same as in 1882.

Last March we moved into a new brick shop built expressly for us, which affords us ample room for our increasing business.

We have added to our productions during the year eight and ten-inch shaping machines, similar in design to the six-inch built by us for several years.

Our business at this time is fairly good. We are working a full complement of help at fair price—8½ hours per day.

Prospects in the future look encouraging.

Skinner & Wood, (Steam Engines and Boilers), Erie, Pa., write us:

For the year 1883 we cannot report any increase in the volume of business over that of 1882, and think it is due to the crop of failures in many sections of the country, and large over-production in all lines of manufactures.

Neither can we report that business for the past twelve months has been as profitable as for the seasons of 1881 and 1882, owing to stronger competition, and the necessity many firms are under of realizing on their stocks. In our city labor has not followed the steady decrease in cost of material, though it now seems as if important reductions in this direction might be looked for within the next few months.

Inquiries are only fair, and we don't consider the outlook for the year 1884 sufficiently encouraging to warrant any large increase in our capacity.

Frank & Co., (Wood Working Machinery), Buffalo, N. Y., write us:

The past year has, in many respects, been the best business year that we have ever had. We have worked more men on the average, and been farther behind with our orders. We have not made any changes in prices. We have within the last three months built an addition to our foundry, a room of 50x70 feet. We have also built a larger cupola for melting our iron. We have added a few more tools: have purchased four lathes, one planer, and a drill press. The prospects for trade for the year 1884 are as promising as usual at this time of the year.

J. S. Graham & Co., (Wood-Working Machinery) Rochester, N. Y., write us:

During the past year we have to say that our books show that we have sold about 20 per cent. more than during 1882. We have been agreeably disappointed as to the amount of business done, which is no doubt due to our constantly increasing line of machinery. We have during the past year enlarged our facilities greatly by the addition of machine tools and appliances that are specially adapted to our work. We have also designed and brought out many new machines that replace the old ones on our list, besides several that are entirely new.

The amount of both material and workmanship has been increased, as has also the quality of each, and as matter of consequence the margins have been smaller. We look for a fair trade during 1884.

George B. Grant (Gear Wheels and Gear Cutting) Boston, Mass., writes us:

The past year has been a busy one with me. I have increased my business, and look for a further increase the coming year.

I have been in the business of gear-wheel making and cutting for several years, mostly on small brass work and jobbing, but I have lately increased my facilities with a view to taking in larger work. In future I shall pay particular attention to the systematic manufacture of gear-wheels in large quantities.

Schleicher, Schumm & Co. (Otto Gas Engines), Philadelphia, Pa., write us:

Considering the general depression in the machinery line, our business during the year 1883 has been fairly sustained. Prospects for the year 1884 are good.

Dwight Slate (Machinery), Hartford, Conn., writes us:

My business during the past year has been quite satisfactory, though somewhat diminished from the preceding year. I look for a limited demand for machinist's tools during the coming year, though I have prospective orders that will keep me busy for six months.

There are several imitations of my sensitive drill, of inferior workmanship, offered at low prices that interfere somewhat with my trade; consequently, I have made some changes of design and improvements.

I am about to offer some machines of entirely new design adapted to the use of machine makers, which will be found exceedingly valuable in saving labor, and at prices so low that imitators cannot afford to copy them.

The Deane Steam Pump Company, Holyoke, Mass., write us:

The past year has been a prosperous one with us, and the business done has exceeded in volume that of any previous year.

Fay & Scott (Machine Tools), Dexter, Me., write us:

Our business for the year 1883 has been all or more than we expected, and we consider the prospect good for another year, although we do not expect to be driven or to get orders without considerable effort on our part. Stock and supplies cost us a little less than they did a year ago, though we are paying about the same for labor, and we are selling our tools a little lower in some lines, but are trying to add improvements, &c., instead of reducing the price. We have added several new tools to our plant during the past year, and contemplate still further additions during 1884.

The Hewes & Phillips Iron Works (Machine Tools and Steam Engines), Newark, N. J., write us:

We have an established line of trade and are well satisfied with our year's business. We think the prospects for the coming year very good, and anticipate a business that will be larger and more remunerative than that of the preceding.

The George Place Machinery Company (Railway and Machine Shop Equipment) 121 Chambers street, New York, write us:

While business of 1883 has not been quite up to that of 1882, yet large numbers of those to whom we have sold, report that a spirit of caution prevails generally in the trade. All indications are, there will be a fair business during the year 1884. Prices of tools have settled to about that point where we think they will remain. Our customers are buying only what they need, and say they propose for the present to sail close to the wind. We find a good feeling exists, and see no reason now, why there should not be a steady, through probably slow improvent in the manufacture and sale of iron and wood working machinery.

The Porter Manufacturing Co., Limited (Steam Engines and Boilers), Syracuse, N. Y., write us:

We take pleasure in announcing that our annual statement for the year 1883 showed a marked and steady increase in the volume of business done, and also in the profits realized. We have added very considerably to our buildings and machinery during the past year, particularly in our boiler shop, which is now complete with all improved machinery. In addition to our regular trade, we are supplying large manufacturers of threshing engines with our "New Economizer" return flue boiler, which is our specialty. In common with all other manufacturers, we find business at the present time somewhat depressed, but look for increased activity in trade soon, and anticipate a fair year's business.

The Cleveland Twist Drill Company, Cleveland, O., write us:

There has been a marked falling off in orders for our goods since July 1, but taking the business for the year, it is a decided improvement on 1882. We are at present running "short hours," but expect soon to see a good increase. Owing to the starting up of several new concerns in our line, there has been a gradual lowering of prices, and dealers are afraid to stock up to any extent. One or two manufacturers, not finding the "Bonanza" in the business that they expected, have closed up, and we hear of others that are anxious to sell out.

The White Machine Company (Presses and Clock, Button, Match, Tack and Chain Machinery), Waterbury, Conn., write us:

In the last year we have increased our business about five thousand dollars in tools and extended room, taking out our small engine and replacing it with a Bigelow of twenty horse-power. For the past year we have been engaged in the manufacture of match machines; have made, in all, about forty rolling up machines, twenty rolling off machines, and about fifteen stick machines. The trade is rather slow in that branch, but tack machines seem now to be having their turn. We are expecting large sales in tack machinery in 1884.

Take it altogether, we have had a very prosperous year, and the outlook for 1884 is very good so far, but perhaps not so good as last year.

Beecher & Peck (Drop Presses, Forgings and Special Machinery), New Haven, Conn., write us:

We have had a good run of business this year, excepting during the two months past. We are now quite busy on orders, and expect a prosperous year during 1884. Our drop press business has been good, and our drop forging business has increased greatly during the year.

Kearney & Foot (Files), Paterson, N. J., and 101 Chambers Street, New York, write us:

In the past month we have entered our new grinding, forging and annealing shops on the line of the New York, Lake Erie and Western road, Paterson, N. J. This move greatly increases our facilities for turning out goods. As regards business, the combination now existing among file manufacturers to keep prices steady has made purchases light, dealers only buying from "hand to mouth." This, together with the fact that the iron and steel manufacturing interests of the country, manufacturing of machinery, etc., being quiet tends to curtail our orders; as a result of this we have been running through the month of December on three-quarter time, and shall probably continue through January. Should promises for orders for January be fulfilled, we shall have to run full time and have more than we can do.

We look for a fair trade in the year of eighty-four, notwithstanding the fact of its being a presidential year and the agitation of the tariff question.

Cordesman, Egan & Co. (Wood-working Machinery), Cincinnati, O., write us:

In response to trade for past and prospects for the coming year, would say that our sales for 1883 were the largest we have ever had, and extended to every State in the Union, besides Canada and many foreign countries. Payments have been for the most part very satisfactory. Prices of materials and labor used in our productions have been well sustained, we finding it to our interest to use none but the best to be had. We have made several important additions to our line of machinery, prominent among which we may mention our new double-drum sand-papering machine and our band log saw-mill, both of which embody features a long step in advance of previously existing machines, and from the great economy of time and material which they effect are bound to come into very general use. Well-designed machinery built by first-class mechanics always counts. We cannot in justice close our remarks on this subject without giving credit for a great measure of our success to our friends and coadjutors, the trade press. We are earnest believers and advocates of liberal but judicious advertising, and although we have as yet but a small card in your paper, and have had it running but a short time, we are well satisfied with the number of inquiries received, and have no doubt but that by adhering to our policy of using printer's ink freely, and at the same time making none but the best of machinery, our prospects for a big trade in 1884 are flattering in the extreme.

The Harrison Boiler Works, Philadelphia, Pa., write us:

During the early part of the year 1883 we felt the general depression of trade, but since summer our orders have been steadily increasing, and we look forward to the coming year with prospects of a good trade. We have made some improvements in our product, which are being appreciated by our patrons.

The Brown & Sharpe Mf'g. Co. (Machinery and Tools), Providence, R. I., write us:

We are still quite busy in our various specialties, employing over four hundred hands, which is about the same number we had last year at this time. The prospects of business for the coming year are not so bright as could be wished, but we think it a favorable time to build, and therefore propose to add this spring 128 feet to our main building, which will then have a front of 291 feet, and four stories high, the whole of fireproof construction.

The Straight Line Engine Company, Syracuse, N. Y., write us:

Our business for the entire year 1883 proves to have been better than the year previous, and would have been still better had we stocked up instead of slacking off during dull times in the Summer. We have been steadily increasing for the last three months, and now are driven to our full capacity, working nights to some extent to meet the urgent demands for engines for electric lights and other purposes.

We have not increased our plant to any extent, except in the way of handy devices for doing the work better.

The Osgood Dredge Co. (Dredges and Excavators) Albany, N. Y., write us:

During the past year we have been kept very busy, and have found an excellent market for our dredges and excavators.

Since January 1st, 1883, we have built a very large number and have sent them to all parts of this continent. Among others we shipped six (6) to the Isthmus of Panama to be used by the Panama Canal Company. We have shipped others to Savannah, Ga., Boston, Pittsburgh, Vincennes, Ind., Keokuk, Iowa, Petersburgh, Va., Galveston, Texas, St. Johns, Newfoundland, and other localities.

There is hardly a harbor or river of any considerable size in the country where some of our dredges are not to be found, and, we are pleased to say, they are all giving satisfaction.

We have built several dredges the past year for officers of the Engineer Corps, U. S. A., for use on river and harbor work, an evidence in itself of the character of our machines. Since last January we have taken out a number of new patents for improvements in our machinery, and we have a number more pending in the Patent Office. We are striving to keep ahead in everything relating to dredging and excavating machines.

The president of our company, Mr. Osgood, has just returned from an eight months' visit to Europe, where he devoted much study to the building and working of the best foreign dredges and excavators, only to find that in this country we are far ahead in all machinery of this kind.

Just at present we are not very busy, but we generally expect new orders to come in soon after the 1st of January. We have given out a great many figures for new machines; we have more estimates out now than we had at this time last year. A number of these are for machines for Cuba, Mexico and South America.

Our business during the past twelve months has far exceeded our expectations in January last. Our machinery has been paid for promptly, and we have had no difficulty in making collections. We have every reason to take a hopeful view of business prospects for the coming season, not only for sales in this country, but for export as well.

(We have received several more letters from manufacturers, which for want of space we are unable to present this week. They will appear in our next issue.)

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☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery, nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, JANUARY 19, 1884.

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Machinery Prospects for 1884.

We present this week brief letters from nearly fifty establishments manufacturing machinery, engines, boilers, tools and shop supplies, representing several different States, which have been written in answer to our annual inquiry as to state of business and progress during 1883. A perusal of these letters will give a better idea of the condition of the machinery business than by studying a long-spun statistical review, or a two-column interview with a single individual in a daily newspaper. It will be noticed that few complaints are made about dullness.

The machinery trade is not so much depressed as the iron trade, and the latter not as badly as reports in the daily papers would lead us to suppose. None of our informants say they have reduced wages. On the contrary, several of them mention that there has been no decline, and one in Newark, N. J., declares that "first-class mechanics are difficult to be obtained." Prices of materials have declined, and many shops have increased their facilities, so as to turn out more and better work with the same number of workmen. Prices of finished products are also lower, as a rule, than they were one year ago.

The volume of trade, with but a few establishments we have heard from, has materially declined from what it was in 1882, and a good proportion of them report an increase. But margins of profits are somewhat smaller. Most of those heard from have enlarged their productive capacities within the year, and some others will still further enlarge. It is gratifying to observe that a general hopefulness about the future pervades nearly all the letters we print. Several express a belief in an increase of orders this year. Machine tool-builders seem to have experienced more slackness of orders than steam-engine builders, although the former do not seem to be much troubled in that way.

Reports published in the daily papers two or three weeks ago about depression in the Pratt & Whitney Company's Works, in Hartford, and the discharge of 200 men, prove to be unfounded. They never had 200 more men at work than now, and their letter, which we publish among others here referred to, does not indicate any depression.

Taken as a whole, there is no occasion for lamentations over the condition of the machinery trade.

Opposition to Changes of Measurement.

Parties who take an active interest in the preservation of our existing weights and measures sometimes express annoyance because our manufacturers, who use measures and tools of precision, do not exert themselves to combat the attempts made by advocates of the metric system to interfere with existing standards. They truthfully assert that manufacturers, having expensive tools constructed for producing work of exact sizes, based upon the existing scale of measurement, would be the heaviest losers from any change or disturbance of the present system; and that an arbitrary order to effect radical changes would put our manufacturers to enormous expense, and would in many cases entail financial ruin. Recent events indicate that manufacturers are not so apathetic as they are supposed to be. They may not trouble themselves greatly over the idle vaporings of would-be metrological reformers; but any overt act toward disturbing existing scales of measurement is certain to arouse a wild storm of opposition.

A very small straw sometimes shows how the tide is running. In Great Britain, the sheet-iron and wire gauges fell into such confusion through the use of different gauges in the trade that the Board of Trade prepared a new gauge which they proposed to make standard for the kingdom. This gauge was based upon the inch, and was arranged with the view of interfering as little as possible with the prevailing measurements. Did the manufacturers interested accept the change emanating from its high authority? By no means. They raised the worst kind of a clamor against the new gauge, they held public meetings denouncing it, and they protested to the government against its introduction. Ever since the particulars of the new gauge were published, those interested have been agitating against it, and now the sheet-iron manufacturers have decided that they will continue to use the old Birmingham wire-gauge. The changes proposed were in most cases trifling, and they would have created order out of chaos, yet the conservatism of the individual manufacturers is likely to prevent the reform. When a small change like this meets with such vigorous opposition, there would be something like a tornado raised were an order given to make all screws with the threads cut to the fraction of a meter.

Building Locomotives in Railroad Repair Shops.

A national peculiarity of American machine industry is the strict separation of different departments of manufacture. An individual or a company enters into the construction of a special line of production, and the highest ingenuity is devoted to the invention of jigs, gauges, and machinery for facilitating the work. Users of machine tools have long recognized the fact that the best and cheapest way to get a good, durable machine that will do work properly, is to buy it from those who make a specialty of tool building. In the same way those in want of hydraulic machinery, stamping and printing presses, cotton and sugar machinery, locomotive engines, etc., find it best to obtain their supplies from those following the business. By this means makers are induced to devote capital and engineering talent to perfecting the machinery in their special line, and the results have proved beneficial to the whole machine trade.

In the elevating effect due to this practice of concentrating the best mechanical talent upon special lines of work, nothing has received more benefit than the American locomotive. The established custom of railroad managers purchasing their locomotives from those engaged in the business, induced an emulation among locomotive builders to produce the very best engine for the work they were required to do. This emulation urged on improved methods of construction till, in spite of our high-paid labor, our locomotive builders have been for years able to compete in the open market with European locomotive makers, and even to send locomotives to Europe, although the skilled labor beyond the Atlantic is obtained at a low price. Besides doing this, it has furnished our railroads with a uniformly good locomotive, and prevented the making by inexperienced engineers of mechanical monstrosities, such as can be seen on European railways; and for years American railroads have enjoyed the advantage of obtaining first-class locomotives at a low price.

Considering the manifold benefits thus obtained from the support of good locomotive building establishments, it might be expected that railroad companies would hesitate about seceding from a practice which has worked so well all round; yet there is a growing tendency among master mechanics to abandon contract shops and construct their own engines. We think this is an expensive mistake. It is certain that no railroad shop in the country can build locomotives as cheaply as they can be bought from our best makers. Very few railroad shops possess the means of telling how much new work costs them. Where the repairing of old work and the production of new are mixed up, as they are in nearly all repair shops that aspire to build new engines, keeping the items of expense apart is an extremely difficult matter; but where this has been done in a systematic form, undoubted proofs are furnished that few railroads can afford to build their own engines. When railroad companies, having the excellent facilities possessed by the Pennsylvania, and the Philadelphia & Reading Railroad, find it cheaper to buy locomotives than to build them, companies less advantageously equipped should take pains to count the cost before they indulge in the expensive luxury of building their own locomotives.

Sometimes a master mechanic embarks in locomotive building because he has certain ideas of his own which he wishes to incorporate upon his locomotives. This individuality in mechanical construction has done so much towards perfecting the American locomotive that it deserves every encouragement, but master mechanics need not desert the regular locomotive builders because they have got original ideas which they wish to put in structural form. By transferring their designs to paper, locomotives with every feature formed to suit the taste of the purchaser can be obtained from contract shops. We recently saw a group of seven locomotives whose design departed radically from the ordinarily accepted forms, yet they were built to exact templates which were at the service of the purchaser. The saving of expense effected by the use of standard sizes, when an engine comes to be repaired, is an item worthy of consideration; and where engines are scarce substantial repairs can be effected in an incredibly short time by the interchangeable process.

Locomotive builders following the business on a large systematic scale enjoy all the advantages possessed by the wholesale manufacturer over the mere maker who fits each piece to suit a single machine. They hold a position, in regard to ordinary railroad shops engaging in locomotive building, similar to what a sewing machine company does in relation to the owner of an ordinary machine shop who engages to build ten or twenty sewing machines. The system, the subdivision of labor and the special machinery of the works devoted to a particular line, enable them to far undersell those who do not follow the business regularly. Machinists and other mechanics in regular locomotive works are engaged day after day for years on the same kind of work, and they become proficient in their line beyond anything a man doing similar work at intervals can hope to attain. Moulders long engaged continually upon recurring work very rarely have failures, even with the most complex castings, and every department in the works gains savings in a similar way. The aggregate of these savings and cheapenings of production make up a long bill, which must be added to the expense of locomotives built in shops not devoted to the business. If master mechanics would give these considerations their attention, they would soon reach the conclusion that building locomotives in railroad shops is no more remunerative than the building of lathes in the same place.

Locomotive Boiler in a Steamboat.

When the New York, West Shore & Buffalo Railway Company were getting out their ferry boats for the Hudson river, a locomotive boiler was placed in one of the boats as a temporary arrangement till a marine boiler could be made. The steam in the boiler was kept at 100 pounds, and was reduced for the cylinders by means of a Curtis regulator to a pressure of 27 pounds. When the boat got to work, the locomotive boiler was found more economical than the marine boilers in the other boats, and the result is that the boiler will be left permanently to do the steam-making for the engines.

Different Methods of Economy.

A steam user in New York, like many others of his class, went in for economy at the wrong end. The profits of his business were not great, so he tried to increase them by employing the cheapest kind of help. His engine and boilers gave him a great deal of trouble. Seldom a week passed without seeing machinists or boiler makers doing work on the engine or boilers. One day while the owner was bewailing to a friend his hard luck at having to shut down, so that unexpected repairs should be done, the friend expressed surprise that the delay was not greater considering the character of the help he employed. Try a first-class engineer, said this adviser, and you will find your troubles decrease. The steam user acted on this advice and a day or two afterwards hired an engineer at $4.50 a day.

When things got running smoothly after the change it was found that where formerly about thirteen tons of coal were needed daily to do the work unsatisfactorily it was now done for about nine tons, and there was no trouble from stoppages. That steam user now says that he is just beginning to learn what cheap labor means.

Repairing a Vacuum.

A correspondent who gives us some mechanical anecdotes, mentions an incident which illustrates the difficulties encountered by injectors when first introduced. A lifting injector was put on a locomotive belonging to a small road in Pennsylvania. It worked all right for a few weeks, then it got so that they could not lift the water. The whole mechanical department of the plug wrestled with the injector without avail. A machinist who knew something about the principle of injectors, happened about the engine when the man who was substitute for a master mechanic was trying to start the injector. The machinist said: "I know what is the matter with that injector. The throttle is leaking and destroys the vacuum." "Well," said the M. M. substitute, "you take the vacuum out and I will send it to Philadelphia and get a new one."

Machinery Trade With New South Wales.

United States Consul Kahlo in a late report from Sydney, New South Wales, strongly urges American manufacturers to make an effort to obtain a greater share of the trade with that colony than they now hold. The importation of American agricultural implements had kept increasing, but there is still room for improvement. Under this head the consul says: "As the superiority of the goods of this class manufactured in the U. S. over those of every other country is becoming so universally acknowledged, especially with the reapers, mowers, and threshers, there is reason to believe that a more extended acquaintance with their excellent qualities will soon bring them into more general use." Of carriages he says: "Until a short time ago such a thing could hardly be seen in Sydney, the people having entertained certain prejudices against them on account of their lightness, but as this has proved an advantage, rather than a fault, our carriages of every description are becoming very popular. Almost all the materials used by carriage makers in the colony are of American manufacture." American wood-working machinery has grown extensively into favor, but other kinds of machinery are less patronized than they ought to be. This is due to a great extent because their advantages are not understood. So far as introduced, American hardware, sewing machines, clocks and watches and railway appliances are popular in New South Wales. All that is needed to extend the demand for these articles, is more energy on the part of American merchants. The introduction of our manufactures into a distant country entails so much expense in the start, that many are debarred from entering into the enterprise who perceive its ultimate benefits. In cases of this kind, we think combination might be advantageously employed. An association of manufacturers might be got up which would make the individual expense light, while providing all facilities for pushing foreign business.

Literary Notes.

The January, 1884, issue of "Ealy's Blue Book" of special credits in the hardware, iron, machinery, machinist's and railway supplies, and other metal trades, is out, containing a classified list of over 150,000 names of dealers in the various lines covered. The present book, while forming part of the twelfth volume, is, we believe, the fourth issue which includes the machinery trades as a distinct feature. The reference books and weekly sheets relating to them are published by the John W. Ealy Company, 51 Chambers street, New York, and 79 Dearborn street, Chicago.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(22) R. M., Charleston, S. C., asks: Is the pressure equal on all parts of a boiler, or is it the greatest at the bottom, owing to the weight of water? *A.*—It is greatest at the bottom, for the reason you assign.

(23) N. S., Easton, Pa., asks: Please give me a receipt for bronzing small iron articles. *A.*—Clean, by immersing in sulphuric acid and water, then scour and wash thoroughly. Then immerse in a solution of sulphate of copper, and when coated wash in water.

(24) T. A. W., Port Arthur, Ont., asks: To what depth are car wheels chilled, and do they have to be annealed before boring? *A.*—Car wheels are only chilled on the tread and flange, and the eye is not hardened by the chilling. The depth to which they are chilled is usually about ⅝", but may be more if desired.

(25) L. S. S., Camden, N. J., asks: How large iron can be cut off hot with a saw, and how fast can it be cut? also, would it be practicable to cut up small rods in this way? *A.*—Iron of any ordinary size may be cut in this way. We never timed the operation, but it is cut quite rapidly. Small rods as well as large ones may be cut.

(26) J. S. E., Easton, Pa., asks: What acid will turn brass black, so that it will be of a glossy nature? *A.*—A black lacquer for brass is made of one part nitrate of tin to two parts chloride of gold. The article to be lacquered should be finely polished, then washed with this mixture. After ten or fifteen minutes, wipe off clean.

(27) G. L., Paterson, N. J., asks: Why is there so great a difference in the boiling point of water, it being about 100° in vacuum and 212° at the pressure of the atmosphere? *A.*—The greater the pressure on the surface of the water the greater the pressure (and hence heat) will be required for the inclosed vapor to free itself.

(28) F. D., Newport, Ky., asks: 1. How many cubic feet of air at the pressure of the atmosphere would there be in one cubic foot at 1000 lbs. pressure? *A.*—Assuming the temperature to be constant $\frac{1000}{14.7}=67+$ cubic feet. 2. How many revolutions would it run an engine of one square inch area of piston and 4" stroke, cutting off so as to maintain a mean pressure of 50 lbs. per square inch? *A.*—It is not possible to determine this accurately. Probably from 3,000 to 4,000.

(29) J. A. M., Cleveland, O., asks: How can I tell when a vertical engine is on the dead center, with no other tool than a rule? *A.*—The tool supply is rather limited. In the AMERICAN MACHINIST, of September 2, 1882, you can find a plan for finding the dead center on a locomotive engine, but which is equally applicable to any other form of engine. You will have to substitute some revolving part—like the crank-wheel, or even the coupling—for the driving-wheel, and use your rule to measure from some fixed point, instead of the tram shown.

(30) A. L. V., Laceyville, Pa., asks: 1. How much power will an 8"x10" automatic engine develop, the steam and exhaust pipe being 2½", boiler pressure 80 lbs., and revolutions per minute 300? *A.*—If of good construction, thirty to forty-horse power. 2. How much power will an 8" leather belt transmit, running on two 44" pulleys making 300 revolutions per minute, with a tightener on the slack side of belt? From thirty to forty horse-power, if the conditions are favorable.

BUSINESS SPECIALS

Transient Advertisements, 50 cts. a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Match Machinery, F. Chillingworth, New Haven, Ct.

James W. See, Consulting Engineer, Hamilton, O.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

F. VanWinkle, Mech. Engin'r, 22 Cortlandt St., N. Y.

Models & Mach'y—G. D. Lambert, New Haven, Ct.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

"Tack Machinery"
Willets Manufacturing Co., Providence, R. I.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn.

Wood Engraving done in best manner. Designs furnished. Edward Sears, 48 Beekman St. New York

Foot Power Machinery, for workshop use, sent on trial if desired. W. F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Patents.—Franck D. Johns, Att'y at Law & Solicitor of Patents, 617 Seventh St., Washington, D. C.

Pattern and Brand Letters. Vanderburgh Wells, & Co., corner Fulton and Dutch streets, New York.

Universal grinders for lathe-centers, chucks, angles, or cylinders. C.C. Hill, 144 LaSalle st., Chicago, Ill

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

For sale, lathes of best designs from new patterns. George A. Ohl & Co., E. Newark, N. J.

Herbert W. T. Jenner, Mechanical Engineer and Solicitor of Patents, 626 E st., Washington, D. C.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Jack pump and ladder chain machines, 40 to 80 links per minute, direct from coil. The Gaylord, Cross & Speirs Company, Waterbury, Conn.

The "Wax Process" engravings shown in the AMERICAN MACHINIST each week are made by Struthers, Servoss & Co., 32 Frankfort Street, N. Y.

New Books, relating to steam, the steam engine, mechanics, machinery, and engineering. Send for catalogue. Fred. Keppy, publisher, Bridgeport, Conn.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large: prices low. Frasse & Co., 62 Chatham St., N. Y.

H. O. Reinhardt, M. E., Mem. Am. Soc. Mining Eng., Chihuahua, Mex., invites correspondence of manf'rs of machinery desiring to introduce same in Mexico.

The Complete Practical Machinist, $2 50; the Pattern Maker's Assistant, $2.50; Mechanical Drawing Self-taught, $4 00; books for practical machinists. Address, Joshua Rose, Box 3,306, New York City.

"Painting and Painters' Materials."
The best book for all who paint, deal in paint, or have painting done. $2 25. For sale by "The Railroad Gazette," 73 Broadway, New York.

BOUND VOLUMES of the AMERICAN MACHINIST for 1880. A limited number for sale at $3.50 per volume, express charges to be paid by purchaser. $4.50 per volume will be charged for 1881 and 1882. AMERICAN MACH. Pub. Co., 96 Fulton st., New York.

"HOW TO KEEP BOILERS CLEAN."—A book of seventy-two pages, telling how to prevent scaling, foaming, priming, and burning, with other valuable information, will be sent to any address FREE of postage, by James F. Hotchkiss, 86 John street, New York.

Any of our readers who have complete files of Volumes I. and II. in good condition, bound or unbound, can probably find a purchaser by addressing us, and stating the lowest price they will accept. AMERICAN MACHINIST PUBLISHING COMPANY, 96 Fulton street, New York.

EXTRACTS FROM CHORDAL'S LETTERS, containing nearly 400 pages, 12mo, handsomely bound in cloth. New and enlarged edition, with additional illustrations, many of them humorous and all effective—over 50 in all. Just the thing for a holiday or birthday gift. Price $2. Published by John Wiley & Sons, 15 Astor place, New York.

Patent "Common Sense" Binder for the AMERICAN MACHINIST holds 52 weekly issues in good shape. Sent to any address, in the United States, by mail for one dollar. To Canada and foreign countries 75c., the purchaser to pay custom-house duties and express charges. American Machinist Publishing Co., 96 Fulton street, New York.

Since October 4 *The Sanitary Engineer* has been published every Thursday in London, the date of issue there being two weeks later than the date in New York. The American issue complete, advertising pages as well as reading matter, is sent over each week in sheets. These are folded and bound in London, with an attractive colored cover, on which appear advertisements intended for the British and Continental readers of the paper. The publishers guarantee for the next year a larger English circulation, among the same classes as read it in the United States, than is now enjoyed by any English publication of a similar character. These include architects, clubs, chemists, civil and sanitary and mechanical engineers, gas and water companies, builders, contractors, manufacturers of food products, pharmacists, electricians and manufacturers of electric lighting apparatus, etc., health officers, physicians, plumbers, manufacturers and dealers in water, gas, steam and plumbers' supplies, officers of public institutions, managers of large corporations, libraries, reading-rooms, and intelligent householders generally.

The Sanitary Engineer, conducted by Henry C. Meyer, is published every Thursday at 140 William Street, New York, and 92 and 93 Fleet Street, London.

Subscription, U. S. and Canada, $4 per year, post-paid. Foreign, $5. Single copies, ten cents, from all newsdealers. Specimen copies free, if this advertisement is referred to.

MANUFACTURES.

The works of the Cleveland, O., Rolling Mill Company, recently burned, are being rebuilt.

The Chattanooga, Tenn., Foundry and Pipe Works have been enlarged, and the capacity nearly doubled.

The Fall River (Mass.) Iron Works are preparing to add ten new nail machines to that department of their works.

Meeker & Hedden, planing mill, Newark, N. J., will increase their power by putting in a 150 horse-power engine in the spring.

S. Roebuck, 164 Fulton Street, New York, will soon build a factory and planing mill for making weather strips in Brooklyn, 44x95 feet.

The citizens of Stroudsburg, Pa., have raised one-half the money necessary to build a $10,000 glass-works.

The Charlottesville, Va., Woolen Mill, a very prosperous concern, proposes to increase its capital stock to $200,000.

The Malone Lumber Company is building a saw-mill at Helena, Ark., to cost $75,000. It will cut umber for Northwestern factories.

The cotton factory at Anniston, Ala., is now running late at night, to enable it to keep up with its orders.

James Aitchison, Cleveland, O., contemplates doubling the capacity of his machine shop, if trade keeps up as well with him as at present.

The report about the Patten Car Works going to be started up again, in Bath, Me., is false. Mr. Patten does not know how the report got started.

The *Alvord* (Texas) *Messenger* says: "W. H. H. Keltner talks of running a machine shop at this place, to manufacture the Louder corn and cotton planter."

The Norton Iron Works, at Ashland, Ky., are preparing foundations for their new works, and working on their machine shop. The company is in good financial shape.

The Spencer Rifle Company, at Windsor, Mass., are putting in their new machinery, which will require an additional force of fifty or sixty skilled workmen in the spring.

The Lowrey Wagon Factory, at Augusta, Ga., is to be enlarged by the addition of another building, 50x170 feet, to be supplied with wood-working and blacksmithing machinery.

The Knott & Harker Manufacturing Company has bought grounds in Pittsburgh, Pa., and will build a foundry 100x175 feet, besides a large warehouse and other buildings.

The Wheeling and Lake Erie shops, at Norwalk, O., are about completed, and will soon be ready for operations. Mr. O. P. Dunbar, formerly of the Canadian Pacific, has charge of the shops.—*Railway Age*

The Goss Marine Iron Works, of Bath, Me., have so much work on hand that they are obliged to run over-time three nights a week, and are in want of more machinists that are used to marine work.

The Gordon & Maxwell Company, Hamilton, O. have contracted to furnish the Hamilton Water-Works one of their vertical compound condensing engines with a daily capacity of 3,000,000 gallons.

M. C. Jones has established himself at 39 Dey street, New York, where, in addition to the Jones arch plate and boiler setting, he will handle the Coutie compound condensing engine, and the Moore water-tube boiler.

The Boston *Commercial Bulletin* says, the Weymouth (Mass.) Iron Company, which has been unable to do business for a large part of the past season, on account of lack of water, is having a 400-horse power engine built, and will no longer depend on water.

It is reported that a manufactory is in process of establishment at Nashville, Tenn., for the manufacture of what is known as "Pole Road Locomotives." This locomotive is furnished with grooved wheels to be run on wooden poles, instead of metallic track.

Wm Yagle & Co., Limited, have completed a new foundry at 32d Street and the Allegheny Valley Railroad, Pittsburgh, Pa. The main building, L-shaped, two stories high and iron-clad, is 80x30 and 24x40. The company intend making all kinds of Iron castings.

It is reported that the Machine Works at Roanoke, Va., will soon begin operations on a larger scale, employing from one thousand to twelve hundred hands. Locomotive building will also be commenced in addition to general machinery work.—*Baltimore Manufacturers' Record.*

It is said that the Pottstown, Pa., Iron Company contemplate erecting a large universal plate and shape mill on their grounds, just east of the already large works. The mill is to be 220 feet in length, and is to be fitted up with all the modern improvements.

The Stillwell & Bierce Manufacturing Company, Dayton, Ohio, manufacturer of turbine wheels and feed-water heaters and purifiers, has completed two additions to its works—one 76 by 40 feet, and the other 40 by 60—by which it will increase its capacity one-third.

The firm of C. A. W. Stokes & Co., Petersburg, Ill., has been reorganized under the title of the Blunt Press Drill Co., and will devote itself to the manufacture of Blunt press drills, in which it has lately made some important improvements. The company have also largely increased their capacity.—*Industrial World.*

Guild & Garrison, Brooklyn, N. Y., have issued a new catalogue of their steam and vacuum pumps and air compressors. It is printed upon heavier paper, and with greater typographical excellence than the catalogue they issued last April. Some additions have been made.

From the Glasgow *Engineer* we learn that Messrs. Thomas Shanks & Co., of Johnstone, Scotland, are making important extensions to their works. While business generally, in the machine trade, is depressed in Great Britain, it gives us satisfaction to perceive this indication of the continued prosperity of this firm, whose large lathe we illustrated a short time ago.

The pool of the tube manufacturers has finally been formed, and the prices will be increased. The principal firms of the new combination are: Morris, Tasker & Co., of Philadelphia; the American Iron and Tube Company, of Middletown, Pa.; the Lake Shore Tube Works, of Cleveland, O.; the Reading Iron Works, Reading, Pa.; National Tube Works, of McKeesport, Pa.; Spang, Chalfant & Co., of Sharpsburg, Pa.; and the Pennsylvania Tube Works, of Pittsburgh. The National Tube Works has cut down the wages of its workmen 12½ to 25 per cent., taking effect January 1st.

Machinists' Supplies and Iron.

NEW YORK, January 3, 1884.

Dealers in general supplies, while conceding light orders, are inclined to look philosophically at the situation. Prices, they believe, cannot rule materially lower, unless manufacturers make lower prices. Better trade is anticipated after the first few weeks of the new year, the present dullness being in part due to the holiday season.

Manufacturers generally find their year's business footing up better than anticipated, and are disposed to look favorably at future prospects. While in some instances business has shown a falling off, in others the volume has been increased, so that the average has been fairly good.

In American pig iron the outlook has not materially changed, transactions, as usual, being light during the holiday season. The cost as well as the volume of production has been reduced during the past year, and the stock on hand at furnaces is light. This is favorable to future prospects, but the indications are that users will, for the present, continue to buy in small lots. In prices, we quote No. 1 X Foundry, $20 to $21.50; No. 2 X, $19.00 to $19.50. Gray Forge is held at $16.50 to $17.50, with expectations of better demand soon.

In Scotch pig there are but few transactions, with prices—Coltness, $22.50 to $23; Glengarnock, $21.50; Gartsherrie, $23; Summerlee, $22.50; Eglinton, $20 to $20.50.

Antimony is weak; with Hallett's brand, 9¾c. to 10c.; Cookson's, 11c.

Copper—Lake 15c.; other brands, 14c. to 14⅝c.

Lead is held firm, 3.70c. being asked for common pig.

Spelter continues in light demand, but prices have not declined from 8c. to 8¾c. for refined.

In Tin the market is firmer, being strengthened by the advance in London. Jobbing lots of Banca have sold at 20¼c.; Straits and Malacca, 19c. to 19¼c.

✲WANTED✲

"Situation and Help" Advertisements, 30 cents for each seven words (one line) each insertion. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue.

Experienced draughtsman wants a suitable engagement. Address Box 3, AM. MACHINIST office.

An experienced mechanical draughtsman wants a position. Address Designer, Box 5, AM. MACHINIST.

Wanted—By a brass finisher, situation as foreman. Twenty-four years' experience; sober and industrious. Address, Box 13, care AMERICAN MACHINIST.

Wanted—A situation, by a practical draughtsman and machinist, experienced in designing special machinery. The West or South preferred. Address Y, Box 6, AM. MACHINIST.

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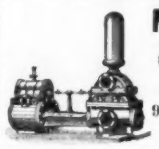

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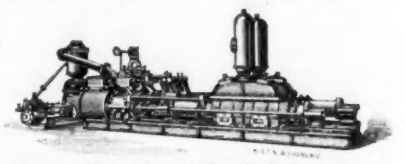

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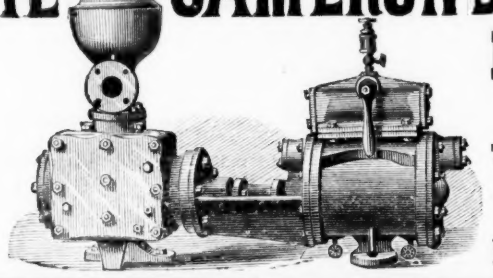

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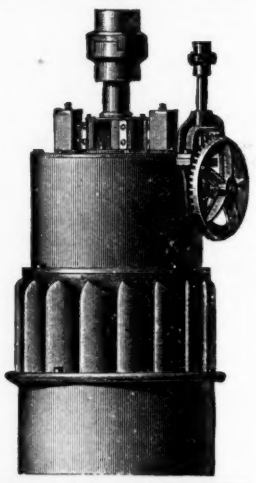

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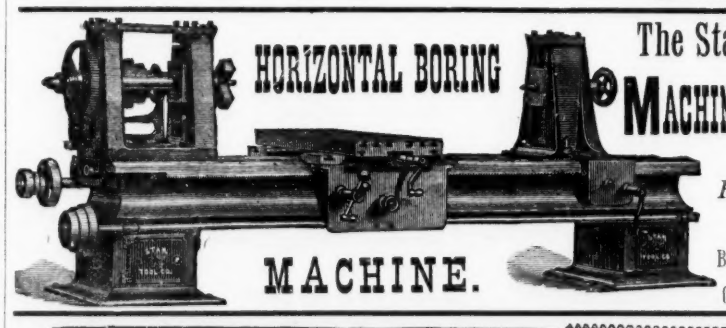

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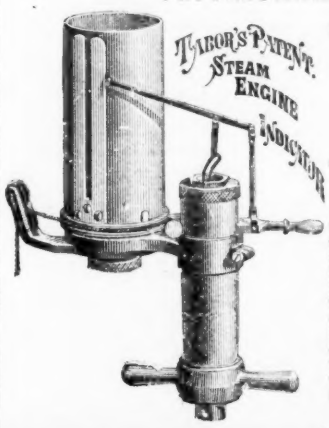

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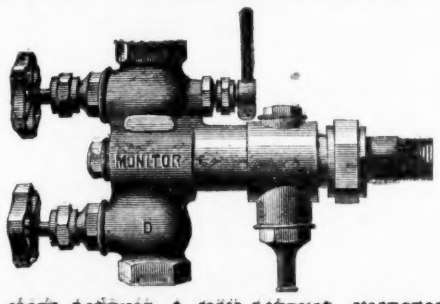

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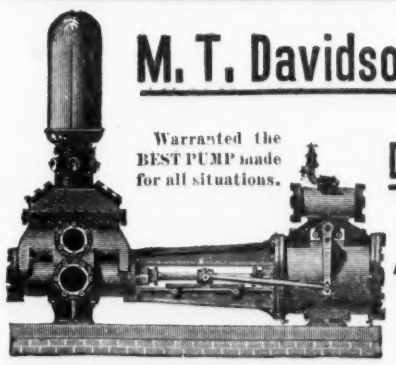

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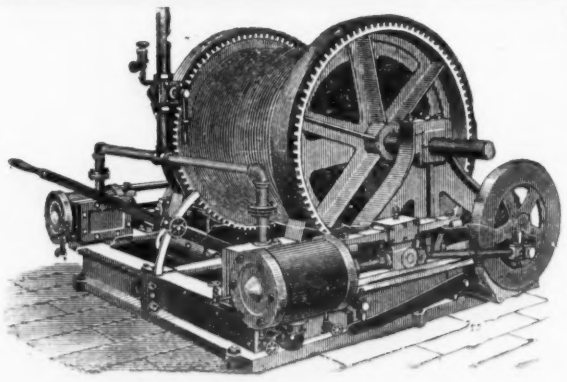

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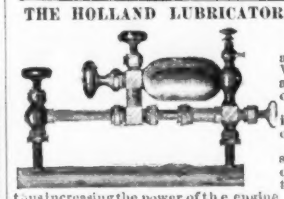

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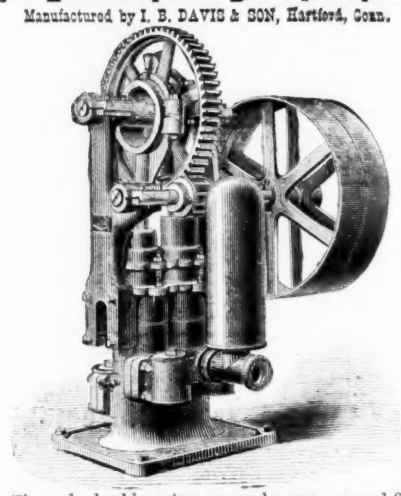

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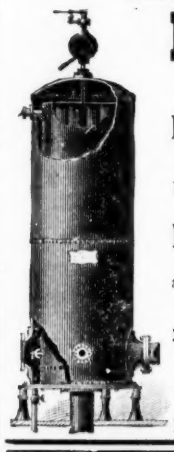

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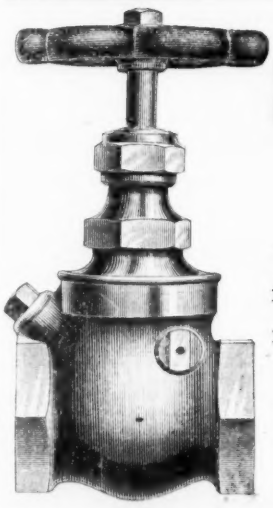

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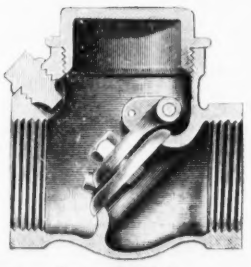

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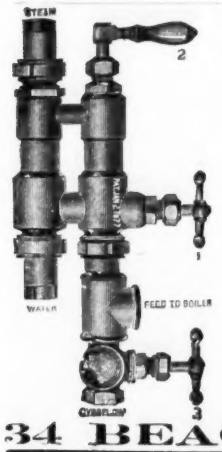

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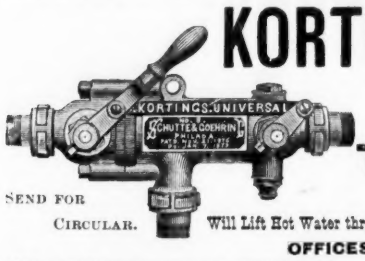

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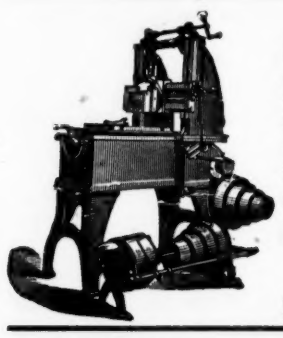

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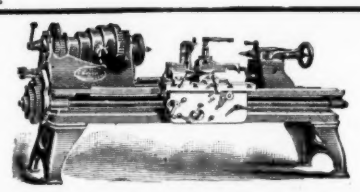

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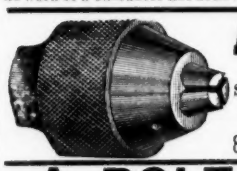

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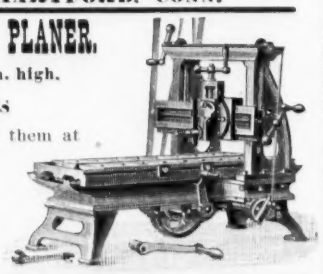

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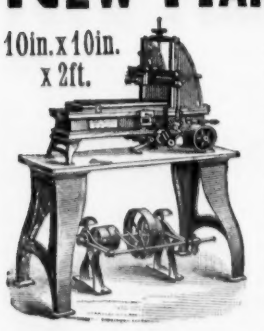

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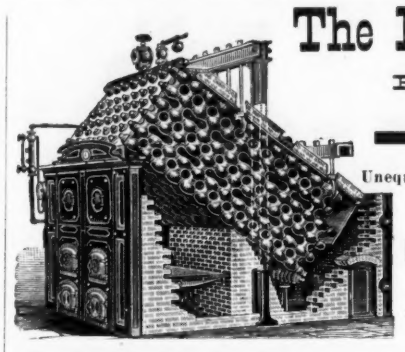

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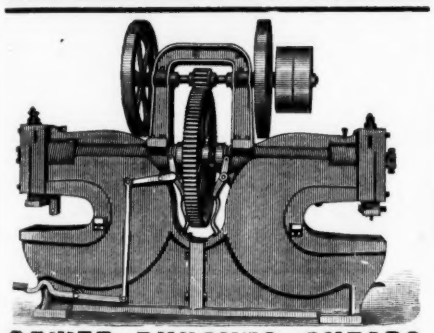

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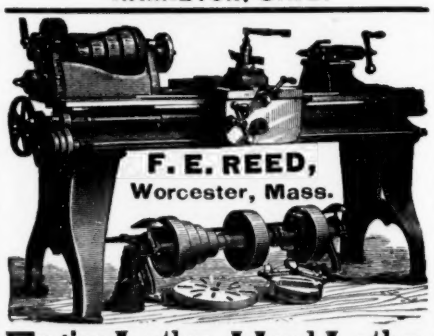

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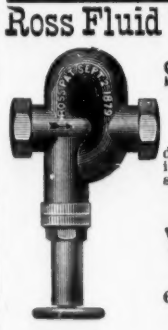

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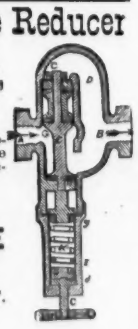

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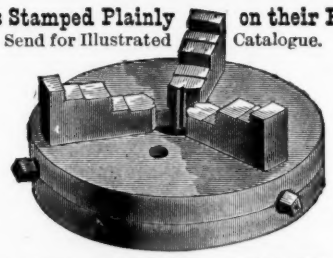

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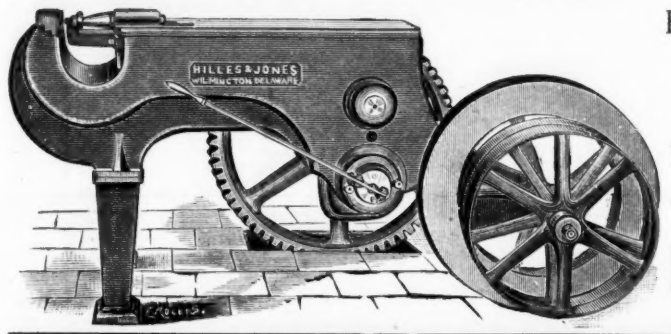

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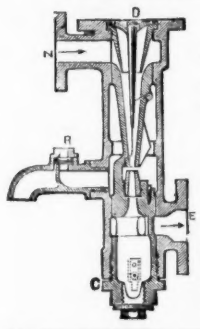

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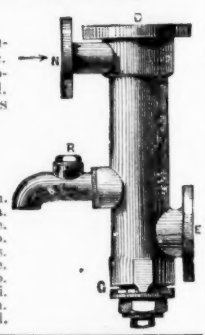

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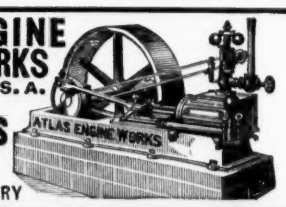

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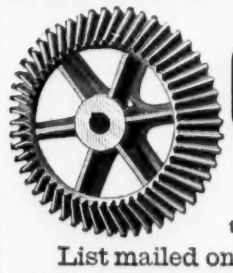

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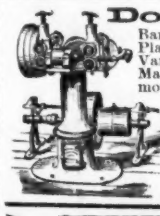

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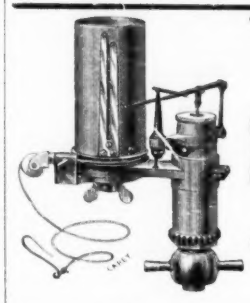

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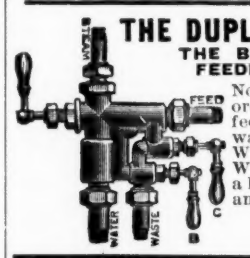

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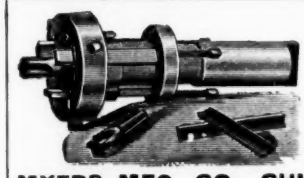

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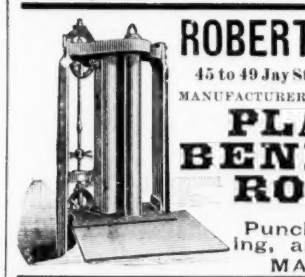

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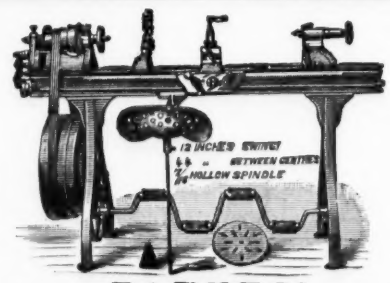

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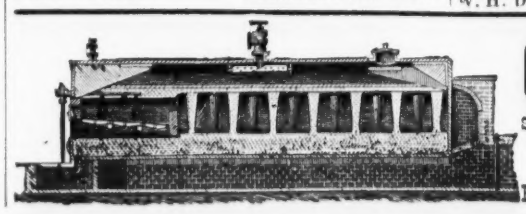

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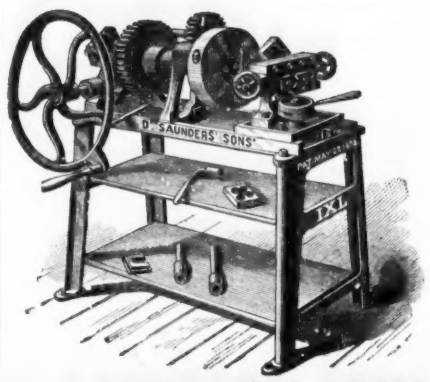

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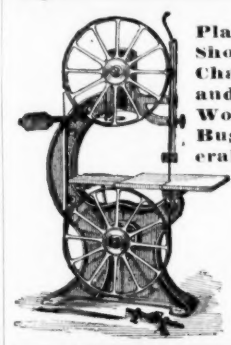

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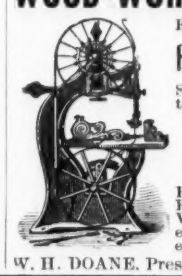

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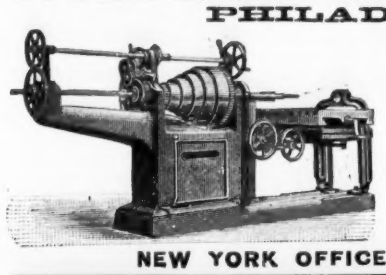

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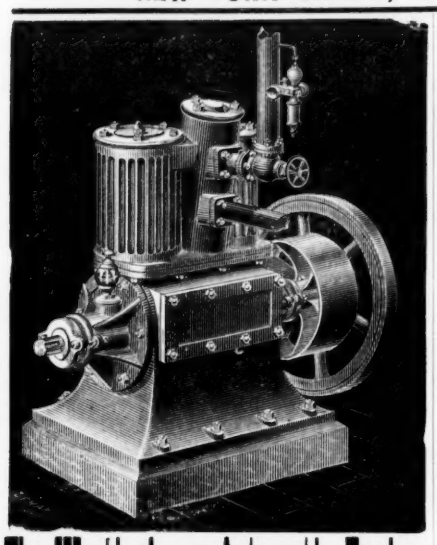

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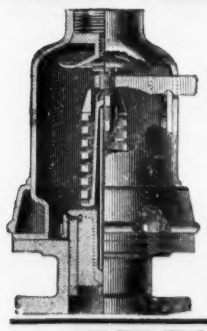

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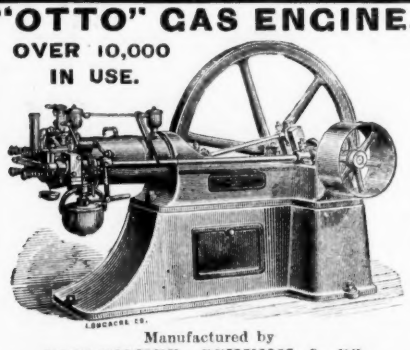

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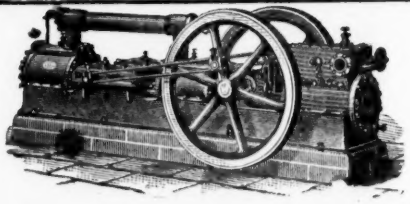

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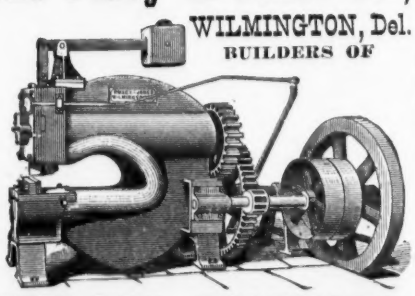

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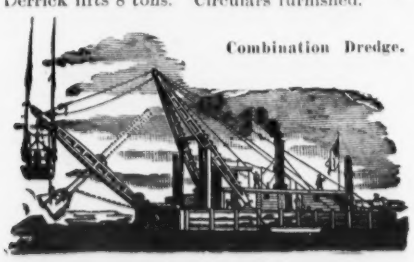

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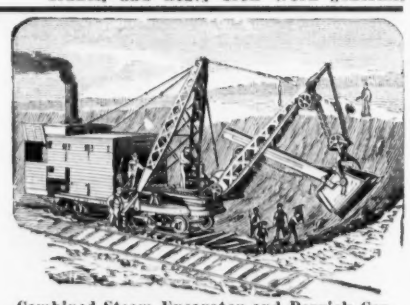

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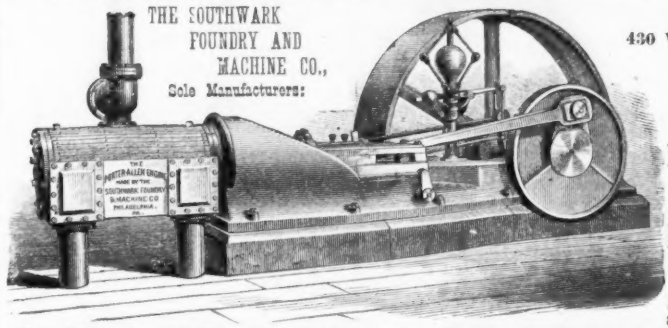

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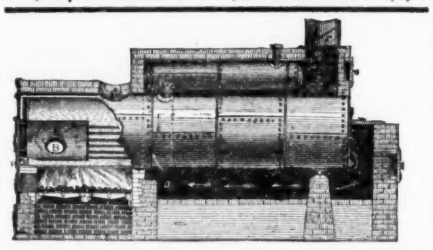

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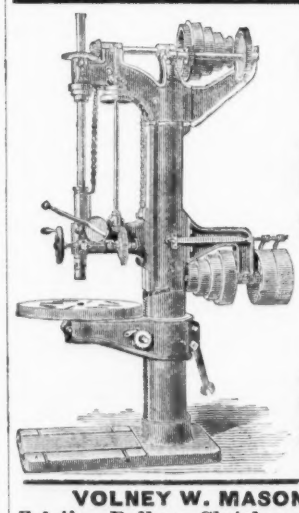

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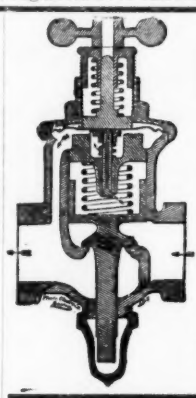

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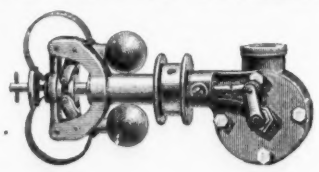

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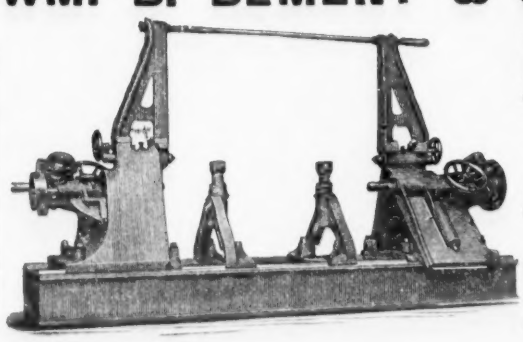

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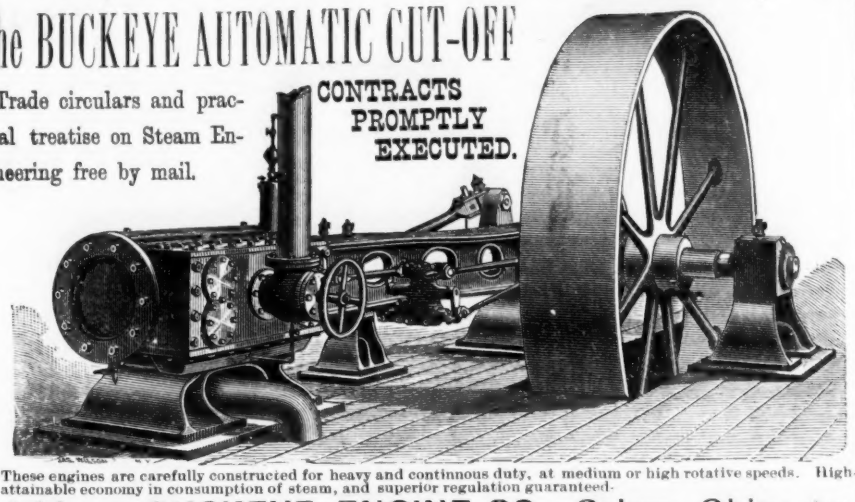

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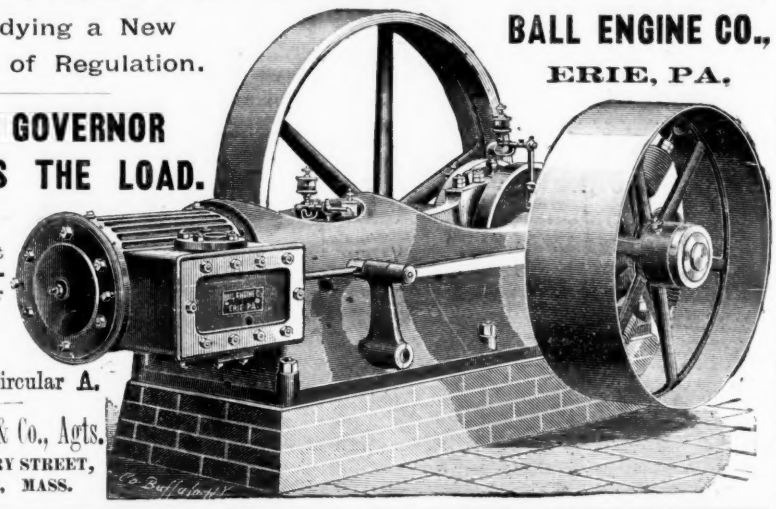

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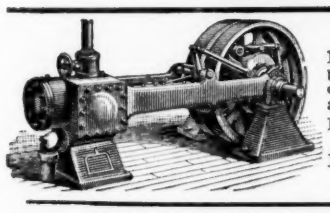

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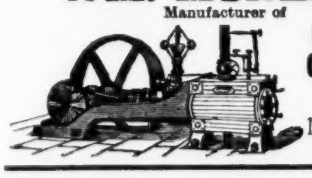

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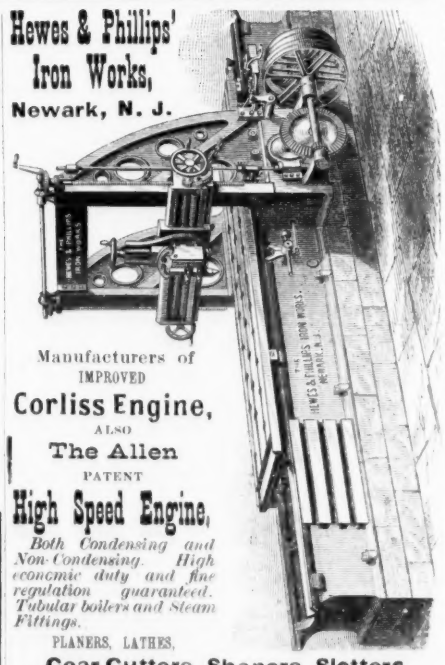

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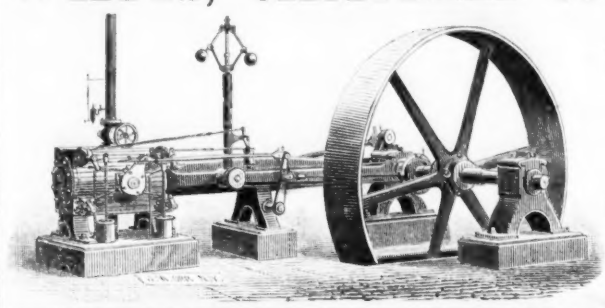

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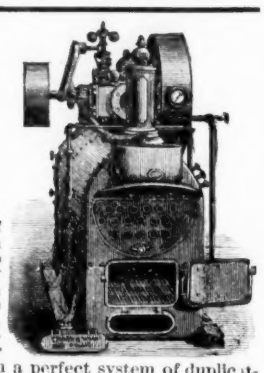

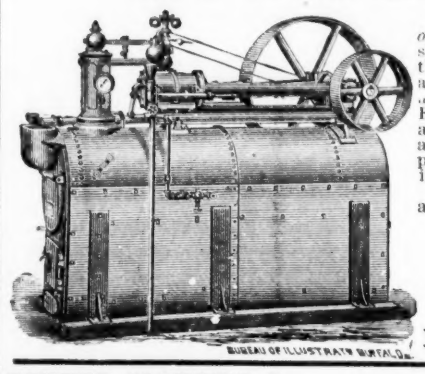

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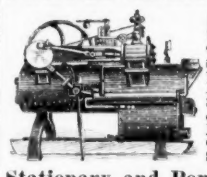

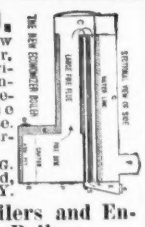

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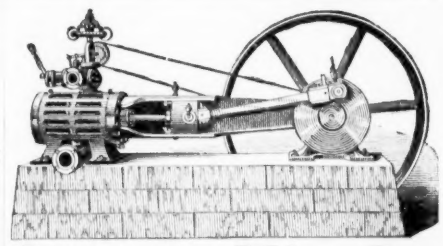

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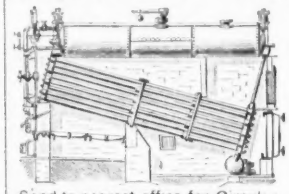

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Two Engine Lathes,	8 feet bed,	18 in. swing.
One "	each 6 and 8 feet bed,	16 in. swing.
One Engine Lathe,	5 feet bed,	11 in. swing.
One 3½ feet bed,	10 in. swing,	foot power Screw Cutting Lathes.
Two Iron Planers,	to plane 8 feet,	30 x 30 in.
One "	to plane 7 feet,	26 x 26 in.
One "	to plane 4 feet,	22 x 22 in
One "	to plane 3 feet,	18 in. x 16 in.
One each 22, 26, 30 and 38 in. swing B. G. S. F. Upright Iron Drills.		
One Shaper, 15 in. stroke.		
One Shaper, 12 in. stroke.	New pattern.	
One Shaper, 10 in. stroke.	" "	

Send or lists of New and Second-hand Tools.

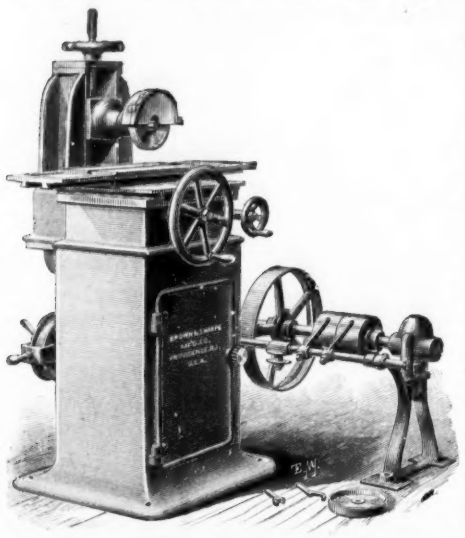
The George Place Machinery Co.,
121 CHAMBERS & 103 READE STS., NEW YORK

SMALL SURFACE GRINDING MACHINE.

MADE BY

BROWN & SHARPE MFG. CO.

PROVIDENCE, R. I., U. S. A.



The above cut represents a small surface grinding machine, not only intended for grinding and finishing hardened dies, punches, &c., but many of the small parts of machinery and tools requiring a true and bright surface, generally produced with files, &c.

Placed in the hands of an intelligent workman, more and better work can be turned out, and at a cost not exceeding one-quarter of that incurred by the old method; while the amount of work that can be done on it renders it invaluable for machine and tool work.

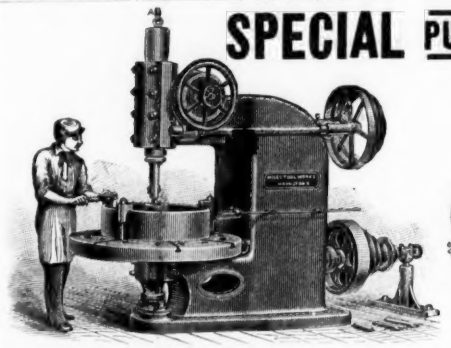
The spindle and boxes are provided with means to compensate for wear, and the exclusion of emery and dust. Motion is imparted to the table by the hand-wheels shown.

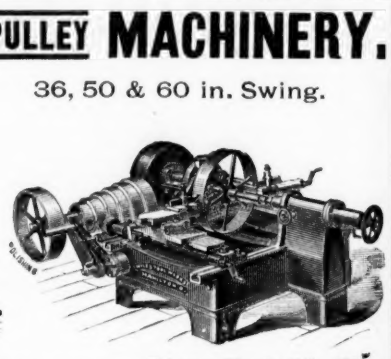
Using a 6-inch emery wheel, a piece 5 inches high, 6 inches wide, and 18 inches long, can be ground: and, by fastening a pair of small planer centres on the table, the grooves of taps, reamers, &c., may be readily sharpened and finished.

Countershaft should run 275 turns per minute. Tight and loose pulleys, 6 inches diameter, 3¼ inches face. Weight of machine complete, ready for shipment, 1,080 lbs. Price with everything shown in cut, $300.

SPECIAL PULLEY MACHINERY.

36, 50 & 60 in. Swing.





NILES TOOL WORKS, Hamilton, O. Chicago, March 19th, 1883.

Gentlemen:—We have been using continuously for the past two years the **FIFTY-INCH PULLEY MACHINES** purchased of you, and they have not cost us a cent in the way of repairs. We have turned out as high as **19 pulleys ranging from 20 to 28 inches in diameter and from 6 to 8 inches face in 10 hours. Have turned 8 pulleys 48 x 8 inches in 10 hours.**

The manufacture of pulleys comprises quite a large part of our business, and we looked over the field considerably before purchasing of you, and this, with two years' experience, enables us to say, we think them **THE BEST PULLEY MACHINES** in the market.

Very truly yours, **W. McGREGOR & CO**

WESTON'S PATENT JIB CRANES

OF ANY CAPACITY. FOR HAND OR POWER.

Particulars on application and full specification and tender promptly submitted on receipt of capacity, height of mast, length of radius, and whether to be operated by hand or power.

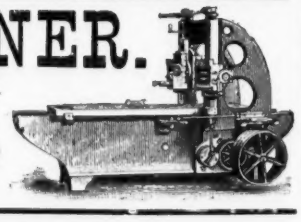
SOLE MAKERS:

THE YALE & TOWNE M'F'G CO.

STAMFORD, CONN.

JUST OUT.—A preliminary illustrated and descriptive circular of the various types of cranes made by us, mailed on application.

THE GRAY PLANER.



26 in. x 26 in. x 6½ ft., wt. 7,000 lbs. 26 in. x 26 in. x 8½ ft., wt. 8,200 lbs.

New Descriptive Circular now ready.

C. A. GRAY, Jr. & CO.,

COR. 8TH AND SYCAMORE STS.,

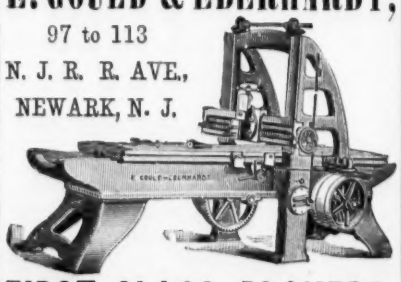
CINCINNATI, OHIO.

E. GOULD & EBERHARDT,

97 to 113

N. J. R. R. AVE.,

NEWARK, N. J.



FIRST-CLASS PLANERS.

THE BROWN COTTON GIN CO.,

New London, Conn., Sept. 23, 1882.

Gentlemen:—In regard to the 26 in. x 26 in. x 8 ft. Planer, bought of you some time ago, it gives us pleasure to say that it is the best planer we ever saw. The man we have on it says it, "Takes the cake," being the best he has run during the thirty years he has been running planers. We are well pleased with our purchase, and no other planer would fill our orders, and we will have no other. ED. T. BROWN, Treas.

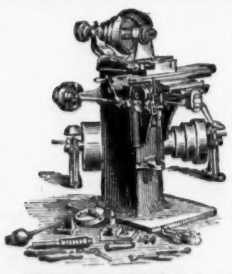
Builders of Machinists' Tools.

E. E. GARVIN & CO.

139 & 141 Centre St., New York,

MANUFACTURERS OF

MACHINISTS' TOOLS,



Milling Machines,

Drill Presses,

Hand Lathes,

Tapping Machines,

Cutter Grinders, &c.

SEND FOR NEW ILLUSTRATED CATALOGUE containing descriptions of the above machines.

THE PRATT & WHITNEY CO., HARTFORD, CONN.

Have Ready for Delivery:

Dilling Machines—No. 2 Upright, No. 3 Vertical; Nos. 1 and 3, Manufacturers and Manufacturer's Bench; Champion Drills; No. 0 Gang Drills, 10 in. Pillar Shapers. 1, 14 in. Shaping Machine; Hand Lathes, 8, 12, 15 and 18 in. swing; Cutting-off Lathes for 4½ in. diameter. Revolving Head Screw Machines, Nos. 1 and 3; Hand Milling Machines, Nos. 1, 2 and 3; Power Milling Machine, Nos. 2 and 3; Bolt Cutters, Turret Head, Nos. 2, 3 and 4; National, Nos. 2, 3 and 4. Nos. 1 and 2 Screw Shaving Machines; No. 1 and 2 Screw Slotting Machines; 13 in. Plain Engine Lathes; 16 in. Weighted and 19 and 21 in. Gibbed Screw Cutting Lathes. One Double Connection Power Press. Index Milling Machines. Nos. 2 and 3 Horizontal Tapping Machines. Cutter Grinders. 20, 24, 26, 34 and 40 in. Planers. Drill Grinding Machines. No. 2 and 3 Die Sinkers; 10 and 18 in. Lead Tapping Machines; 18 and 38 in. Chucking Machines; Nut Tapping Machines. **Have increased discount on Combination Lathe Chucks;** quotations on application.

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Billings' Patent Adjustable Pocket Wrenches, 4 AND 6 INCHES.

FINISHED SCREW PLATES AND DIES, GENUINE PACKER RATCHET DRILLS, BILLINGS' PATENT DOUBLE ACTION RATCHET DRILLS, TAP & REAMER WRENCHES,

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Billings' Patent Drop Forged & Cold-Pressed Sewing Machine Shuttles

AND ALL DESCRIPTIONS OF

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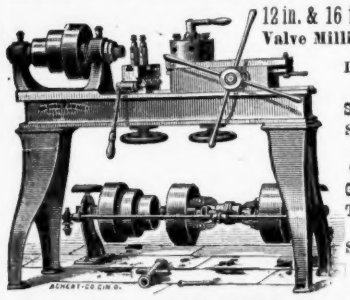

12 in. & 16 in. Monitors

Valve Milling Mach's

Double Key Lathes,

Speed Lathes

Slide Rests

Revolving Chucks for Globe Valves,

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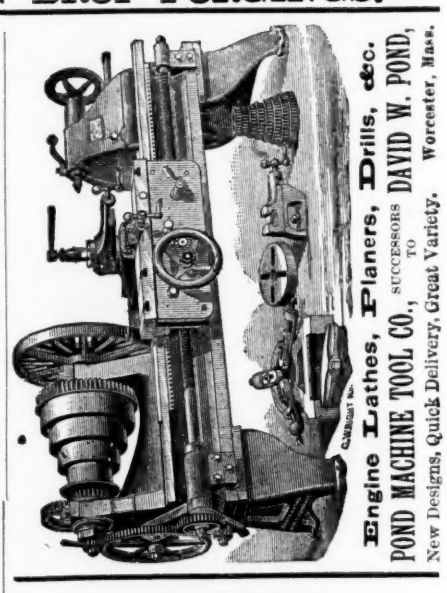
Small Tools and Fixtures.

WARNER & SWASEY, Cleveland, O.



Engine Lathes, Planers, Drills, &c.

POND MACHINE TOOL CO., SUCCESSORS TO DAVID W. POND,

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New Designs, Quick Delivery, Great Variety.

GEO. W. FIFIELD,

Manufacturer of ENGINE LATHES from 16 to 48 in. swing. Cuts, Photographs and Prices furnished on application. Lowell, Mass., U. S. A.

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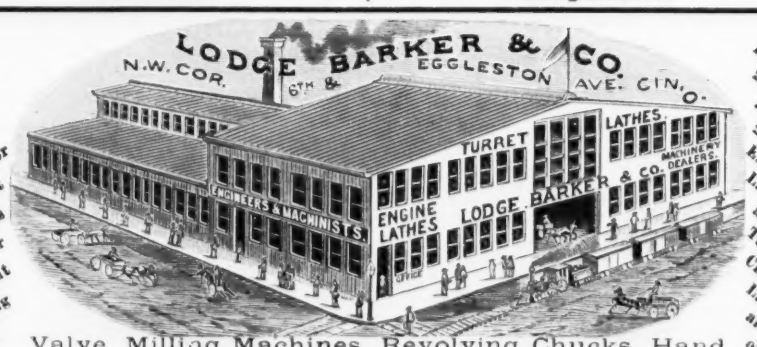

11 in. and 16 in. Monitor Turret Lathes with or without Chasing Bars.

18 in. 24 in. and 26 in. Engine Lathes and Turret Chucking Lathes always on hand.

Valve Milling Machines, Revolving Chucks, Hand Speed Lathes with dove tail set over, and a full line of Brass Finishers' Machinery.

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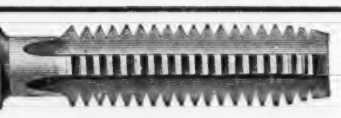

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